The IRON AGE

May 12, 1960 A Chilton Publication The National Metalworking Weekly

Design Show Issue

6 Feature Articles
Program & Exhibits

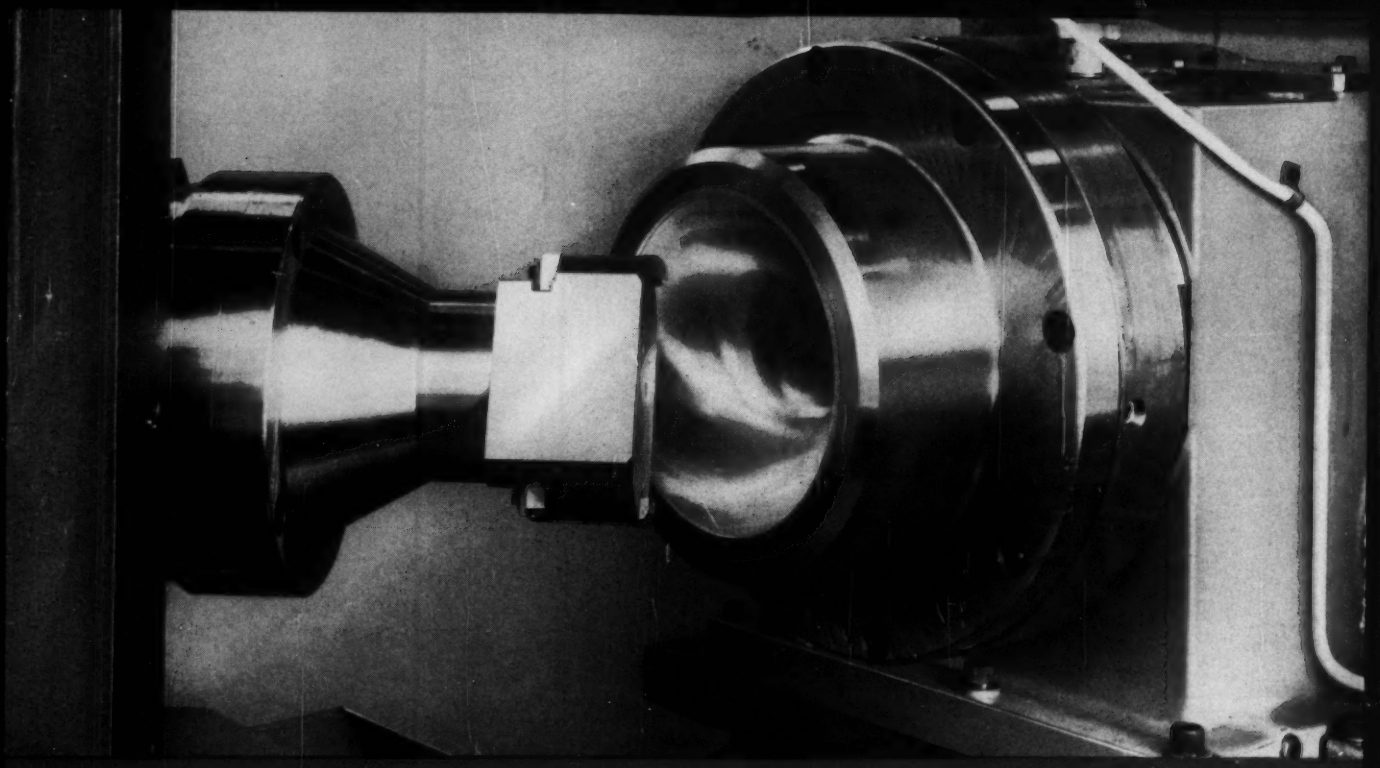
Industrial Designers Margulies and Lippincott—

How Design Helps The Total Marketing Effort P. 141

Is New Construction Holding Its Own? – P. 101

Aluminum Problems Aired in Congress – P. 104

Digest of the Week – P. 2-3



EX-CELL-O CUSTOM TURNING MACHINE MEETS DEMAND WITH PERFORMANCE

WORK: Rough and finish turning of I.D. and O.D. with automatic cycling between loads.

ACCURACY: Less than .0001" tolerance on radii and .0001" on total wall thickness. Surface finish to 10 rms.

MATERIAL: Wrought or forged annealed aluminum hemispheres, 6" to 16" dia.

Custom-equipped with gages, spindle tachometers and other features, hemisphere-turning machine is a job-tailored "special"—yet it is designed to accommodate future production changeover.

59-34

Here are just a few of the reasons why this special Ex-Cell-O Turning Machine meets demand with *precision performance*—every time:

An extremely accurate and rigid work spindle helps slim-down the hemispheres shown at a rate of 15 cu. in. per minute with a 1/8" cut. Separate variable-speed hydraulic motors give cutter speeds from 50 rpm to 2500 rpm, and work spindle speeds from 1/18 rpm to 4 rpm. Dial gages provide constant checks on work spindle slide and cutter plunge depth. Vacuum chucks hold the work securely, and full electrical interlocking protects operator and machine during production.

Perhaps a similar Ex-Cell-O special machine—designed to handle future work as well—is the answer to a production problem in your operation. Call your Ex-Cell-O Representative, or write direct for full details.

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Special fastener does it better at half the cost

OLD BOLT

The sleeve-type bolt was used as a steel strapping handle for railroad cars. Not only was the weld expensive, but the part had inadequate strength for the holding of heavier loads.

NEW BOLT

Bethlehem fastener engineers designed this forged-eye bolt. A greatly increased strength resulted from both the new design and the use of a heavier material . . . *at half the cost of the old style bolt!*

Our ability to redesign fasteners is just one example of how our fastener engineers can study your problem. Perhaps a minor change—or a completely different design—can do your job better . . . and at lower cost. Bethlehem makes just about every type of steel fastener specialty—forgings, rods, bolts, nuts, and stampings.

Just send us a rough pencil sketch or drawing of the part you need, indicating dimensions. After our fasteners engineers have studied it, we'll give you our honest appraisal of what we can do for you. If we can't recommend a practical solution, we'll say so. But if we can help you, and you are fully satisfied with our estimate, we're prepared to give you fast delivery. Just phone our nearest sales office.

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The IRON AGE

May 12, 1960—Vol. 185, No. 19

Digest of the Week in

★Starred items are digested at right.

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Our Foreign Trade: It's a Tough Nut, But 7

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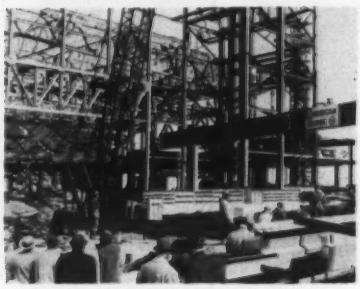
News of the Industry

CONSTRUCTION

Outlook Good—The overall construction level is expected to rise to



over $35 billion in 1960—just 1 pct under the record level of last year. P. 101

USERS' DEMANDS

Standardization — Machine tool builders hear user panel demand standardization. Charge is made that failure to standardize increases production costs. P. 103

ALUMINUM PROBE

"Hot Metal" Deals Denied—Big Three aluminum makers deny "hot metal" deals with foundry customers. Alcoa, Kaiser, and Reynolds spokesmen testify at Congressional hearings. P. 104

ARMY NEEDS

Simplicity and Mobility — The Army's aim of getting the most mobility from its vehicles has resulted in a brisk battle of the metals.

Metalworking

Cover Feature

INDUSTRIAL DESIGN: The designer sets his sights on one goal: A smart, functional product that is more acceptable to the end user. Designers W. P. Margulies (left) and J. G. Lippincott help engineers realize such designs. P. 141

Steel and aluminum out to prove their advantages. P. 106

DEFENSE SPENDING

Emphasis Shifts — When the House of Representatives passed defense spending, it reflected a significant change. P. 109

Engineering-Production Developments

BOND GLASS TO STEEL

To Handle Corrosives — Glass has a number of natural advantages which makes it popular with the process industries. Adding the asset of structural strength by bonding the glass to steel opens the door to industry-wide acceptance. Here's a process that makes such bonds possible. P. 144

COMPOSITE ADHESIVE

For Rocket Motor Cases—Welds cause stresses in solid-fuel, rocket-motor cases. And strong, rigid adhesives can't withstand elastic strains. But a new three-fold adhesive bonding process eliminates trouble spots and reduces cost and weight by 30 pct. A dry adhesive does the trick. P. 146

VALUE ENGINEERING

Key to Lower Costs—Everybody knows that costs are going up. But what is being done about it? One answer is value engineering, a design and function-centered approach. It can result in cost reductions up to 50 pct. And it's based on common sense. P. 148

DESIGN FOR PLASTICS

It Pays Off—There are a few added wrinkles in working with heat-resistant reinforced plastics. It really helps to know how to specify correct design practice to avoid costly revisions. P. 151

CRYOGENIC FLUIDS

How to Handle Them — The increased use of ultra-cold liquid gases poses many problems to the designer. Among them: How do metals react? How can these cryogenic fluids be handled? Scientists and engineers have worked together to solve these problems. P. 154

Market and Price Trends

MARKETING DILEMMA

A New Era?—Steelmakers know that the day of the hard-sell is back. But they aren't sure how long it will last. If it's a long-term situation, then customers can look forward to better service. P. 108

WEST COAST

Non-Defense Industry Wanted—Farwest industry is still largely defense-oriented, says executive v.p. of Bank of America. For firms thinking of expansion there he lists the area's advantages and drawbacks. P. 121

STEEL SUMMARY

Downtrend Continues—Some new orders from automakers can't stem the decline in steel production for some time. New orders still lag far behind production. Sheet market is relatively strong, but other products are depressed. P. 211

PURCHASING

Better Year—Electrical Equipment makers are expecting 1960 to be a better year than 1959 was. Government and industrial orders are bolstering a relatively slow consumer market. P. 212

NEXT WEEK

TECHNICAL CENTER

For R & D Projects — A good way to get the most out of R & D money is with a centralized technical staff. An article in next week's issue will show how such a system helps one company command high caliber abilities.

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Piston-packing belt helps build new cars

THE combination of sharp edges and oil on those pistons was ruining conveyor belts in four months. They cut grooves in the belt, ripped it, tore off the fasteners which held the belt together. The oil soaked into the belt cover, softened it, formed a dirty scum on the surface. Belts had to be cleaned and repaired constantly.

When a B.F.Goodrich distributor heard of the problem, he recommended a new B.F.Goodrich conveyor belt made of Koroseal flexible material. Koroseal resists scuffing, tearing, cutting; it stands oil, grease, most acids and just about everything else that ruins other materials. It can be vulcanized into a continuous belt, eliminating troublesome fasteners.

After a year's service, the Koroseal belt was still going strong—had lasted three times longer than the belt it replaced—carried over 2 million pistons. Even though this is a premium-priced belt, its cost when measured in terms of useful service is 48% lower than the belting it replaced.

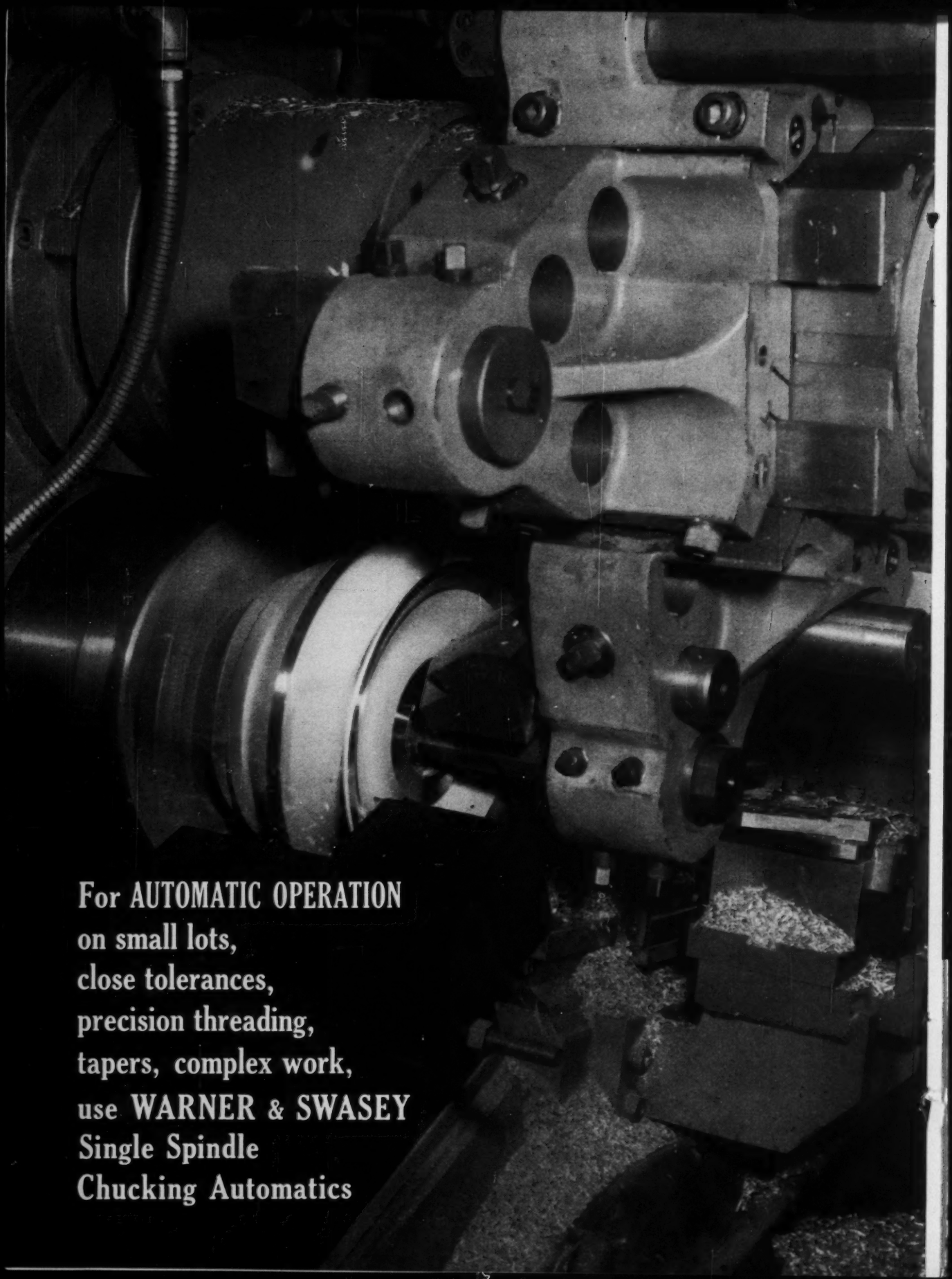
Because the belt has a smooth, nonporous surface that's easy to clean, "locating holes" in the pistons don't get plugged up with dirt.

Your B.F.Goodrich distributor has the exact specifications for the Koroseal belt described here. And, as a factory-trained specialist in rubber products, he can answer your questions about the many products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Department M-839, Akron 18, Ohio.*

Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich

CONVEYOR BELTS



For AUTOMATIC OPERATION
on small lots,
close tolerances,
precision threading,
tapers, complex work,
use WARNER & SWASEY
Single Spindle
Chucking Automatics

Our Foreign Trade: It's a Tough Nut, But...

Sure it's tough for us to meet increased imports and decreased exports. But, over all, we are meeting them and will make progress. There are many reasons why this is so.

Let's eliminate some of the propaganda in talking about selling abroad. The cry that wages are lower abroad is true. They were lower years ago. That's not the whole story.

Some steel companies which put emphasis on the wage angle abroad are doing pretty well selling abroad. Why is this?

For one thing, Britain and West Germany like our cold-rolled sheets. Some steel makers stopped crying the blues and went over there and made a sale—several of them.

Another company has always had an excellent foreign sales setup. So much so that the Government often — unofficially — uses the company's intelligence information. Another firm for years has been treating foreign customers credit-wise as if they were domestic firms. No cash on the barrelhead for that company in areas where others often demand the green stuff on the line.

Then there is that tough Southern steel company which hit foreigners with their own medicine: Lower prices. The experts are waiting to see the effect. But it doesn't take an expert. The firm took action and it will win by it.

There is great worry about foreign competition in machinery. Yet the machine tool makers have been wide awake for years. They established plants, licenses, or liaisons abroad long ago. And, their foreign business has been up in recent months.

Europeans, Asians, and others want many American items and products. Quality, cost cutting, clean design, delivery, close tolerances, availability, replacement-parts setup and servicing are but a few of the things, as well as price, that sell our goods.

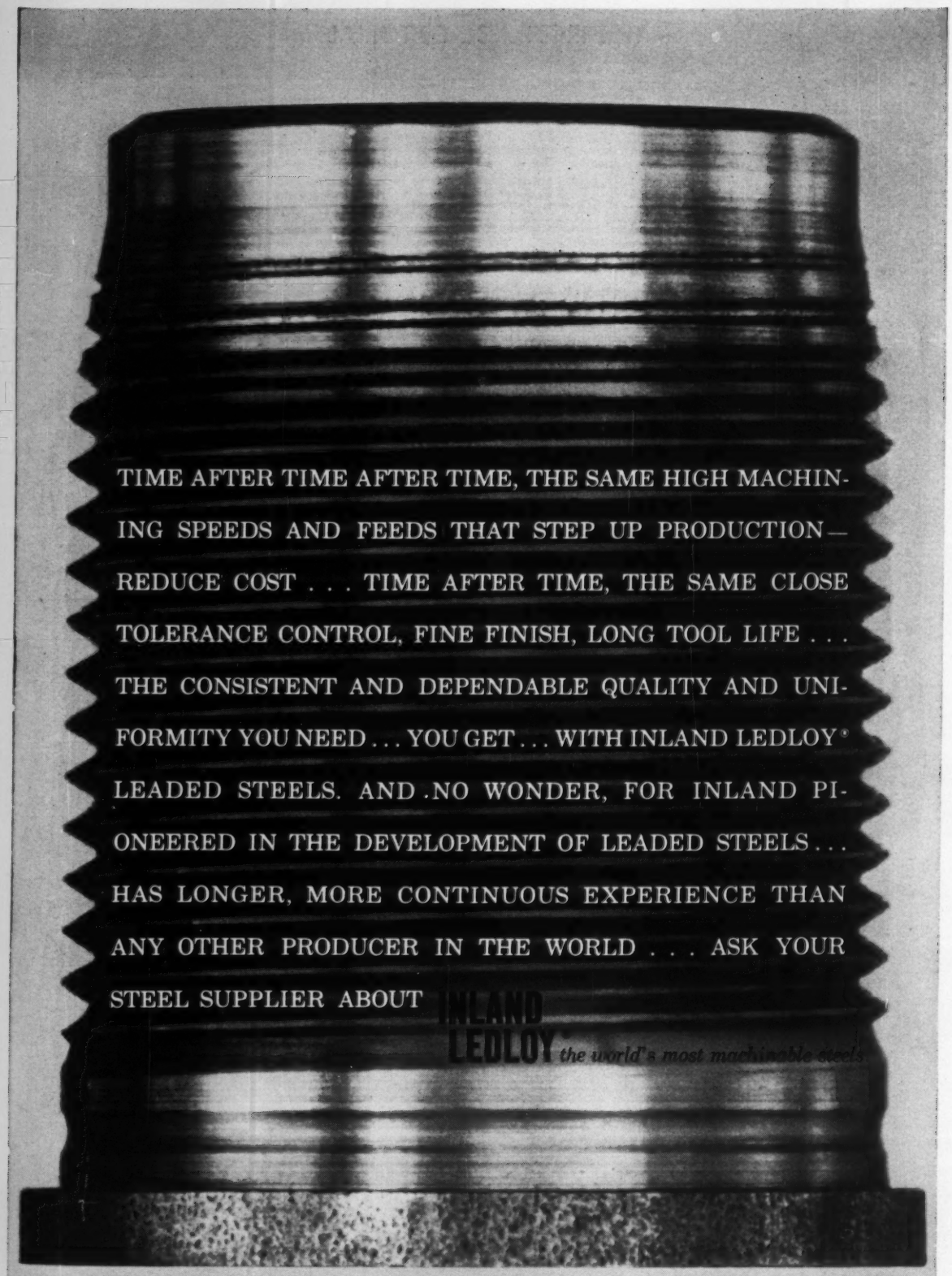
Price is not now, never has been, and never will be the factor which alone sells any item to anyone anywhere in the world. We must do a good huckster's job and talk about all product characteristics.

It is necessary to use money, manpower, brains, and imagination when selling abroad. It is not an in-and-out job—unless, of course, foreign selling is an unwanted stepchild which comes when, as, and if called.

If it's that, skip it!

Tom Campbell

Editor-in-Chief


TIME AFTER TIME AFTER TIME, THE SAME HIGH MACHINING SPEEDS AND FEEDS THAT STEP UP PRODUCTION—REDUCE COST . . . TIME AFTER TIME, THE SAME CLOSE TOLERANCE CONTROL, FINE FINISH, LONG TOOL LIFE . . . THE CONSISTENT AND DEPENDABLE QUALITY AND UNIFORMITY YOU NEED . . . YOU GET . . . WITH INLAND LEDLOY® LEADED STEELS. AND NO WONDER, FOR INLAND PIONEERED IN THE DEVELOPMENT OF LEADED STEELS . . . HAS LONGER, MORE CONTINUOUS EXPERIENCE THAN ANY OTHER PRODUCER IN THE WORLD . . . ASK YOUR STEEL SUPPLIER ABOUT
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Check Bearings at 600°F

To establish load-life charts for self-aligning roller bearings suitable for high-temperature use, Battelle Memorial Institute evaluated 1080 bearings. Among the materials satisfactory for use in the 450° to 600°F range are M-2 tool steel and 440-C stainless steel. The latter exhibits the better oxidation resistance—but it tends toward surface cracking.

Provides Rapid Drilling

Positioning by numerical controls lets a special horizontal boring unit put 56,000 holes in a work area 10 x 10 ft. The unit drills ¾-in. common plate at 23 ipm. It can drill through materials that are stacked up to a total height of 24 in. Linear spindle-position accuracy is on the order of 0.0005 in.

Protect Electric Motors

Special temperature-sensitive thermistors, developed for heavy-duty ac industrial motors, give overload and circuit protection under difficult conditions. This development is expected to allow optimum use of motors with fail-safe protection —without other costly means.

Extends Carbide-Tool Life

Selected natural diamond (SND) grit, introduced at the recent Detroit Tool Show by the Industrial Div., Englehard Hanovia, Inc., already has several users. A major auto company, using SND in resinoid wheels, claims 60 pct longer life in carbide tools. A speciality carbide shop says it couldn't do a platinum-carbide grinding job without SND.

Resists High Temperatures

Columbium-base alloys, having a strength-to-weight ratio comparable to molybdenum, can provide an oxidation resistance ten times better than molybdenum—and 100 times better than pure columbium. But, this oxidation resistance doesn't suffice for long-time service. For extended service, Nichrome, chromium and modified molybdenum-disilicide coatings protect columbium over the temperature range of 900° to 1500°C.

Saws Nonferrous Metals

One aluminum mill reports success in cutting 2¼-in. thick sections of Grade EC bus bar material with a high-speed circular saw. Not only is the unit completing 140 cuts per hour, but it's achieving surface finishes of 30 to 40 microinches. Using a similar saw, a brass mill also reports fast, accurate cutting cycles on phosphor copper. Mist coolant and carbide-tipped blades are used in both operations.

Speeds Up Metal Removal

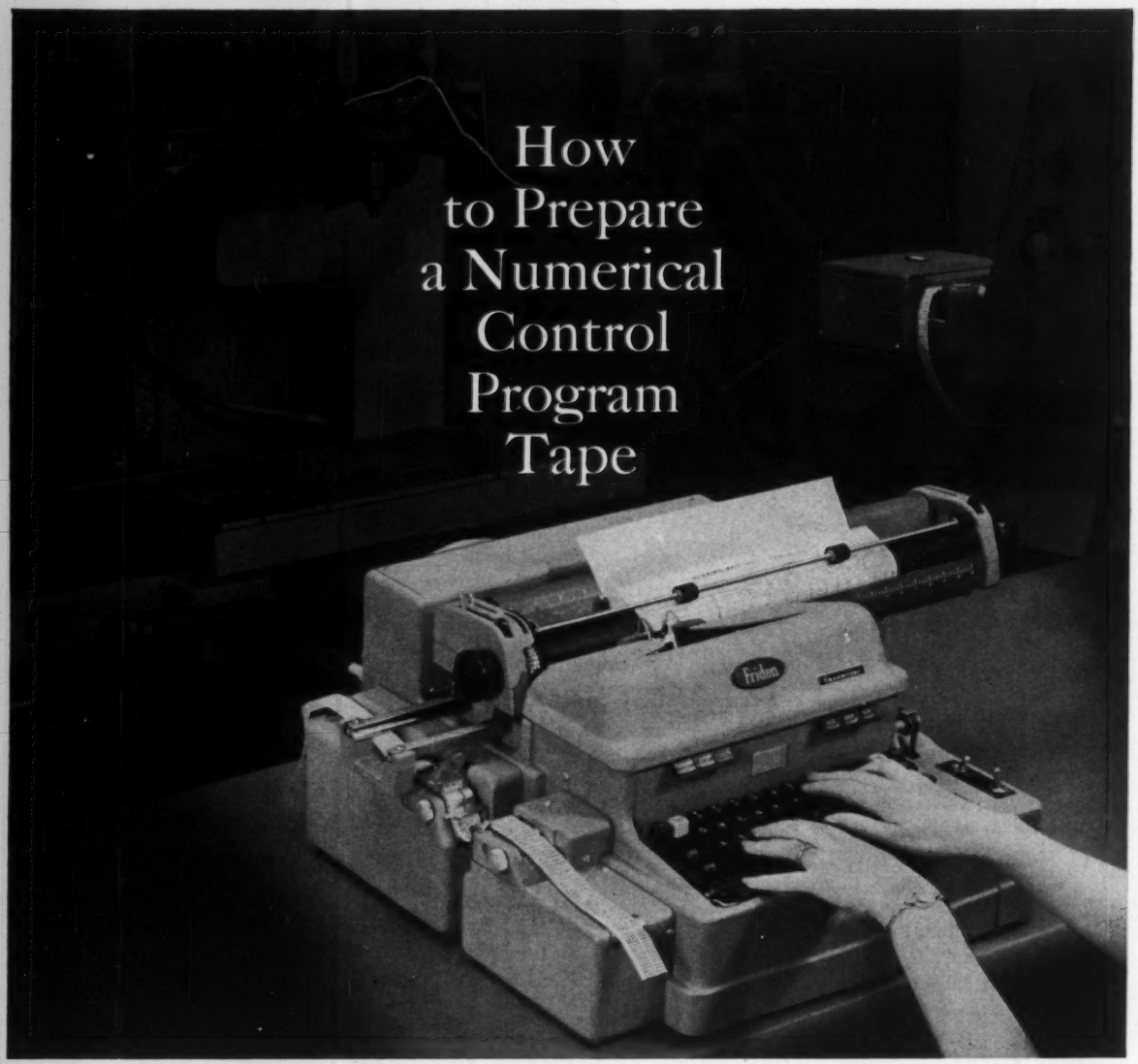
One pass removes 9 tons of steel from an 18-ft diam casting at a midwestern machine shop. Use of two heavy-duty, clamped-carbide-insert tools provides a metal removal rate of 200 cu in. per minute in rough turning 42-ton steel castings. Machining time has been reduced 72 pct—from 17.5 to 4.8 hours per casting.

Shear-Spin Rocket Cases

A new metalforming method, known as shear spinning, suits the production of solid-fuel rocket cases. Thick blanks of the metal to be formed are made to flow over a mandrel. Deformation is in shear rather than in tension or compression. In making a cone, it's possible to get a 45-pct reduction in metal thickness. As blank thickness is reduced, the length is extended.

Giant Extrusion Press

The biggest, self-contained, aluminum extrusion press ever made is going into Reynolds' Grand Rapids extrusion plant. This 4000-ton press will be operating by mid-summer. Its main use will be production of large tubular extrusions. The press is run by a compact oil-hydraulic system. Older extrusion presses operate on a water-hydraulic system that requires lots of auxiliary equipment.



(An Industrial Revolution In One Easy Lesson)

This is the Friden Flexowriter: a heavy-duty, automatic electric typewriter, with an integral tape punch and tape reader. There is no faster, easier or better device for coding paper tapes. Here's why:

1) The keyboard is standard; any competent typist can master the other controls in less than an hour.
2) The operator types a visual proof as she makes the tape; errors are caught and corrected immediately.
3) Automatic parity check guarantees against mis-coding.
4) Tapes can be double-checked (or quickly duplicated) by running them through the reader.

For all these reasons, the great majority of machine tool manufacturers either *have standardized* or *are now standardizing* on the Friden tape reader with Flexowriter input. Take it from the pioneers in numerical control: punched paper tape is the best input; and in punched paper tape, Friden is by far the leader.

In business, communications, graphic arts, and now in heavy industry, Friden source data systems build a new concept. We call it PRACTIMATION: automation so hand-in-hand with practicality there can be no other word for it. ©1960 FRIDEN, INC.

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LETTERS FROM READERS

Rivet Deformation

Sir—I have just read with interest the April 21 issue of The IRON AGE and am particularly interested in the item that appeared on the Newsfront page concerning the U. S. Department of Commerce public report advancing a theory for predicting the transverse shear-creep deformation of a rivet in terms of pure torsional creep. I would be interested in obtaining a copy of this report and plan to correspond with the Department of Commerce but wonder if you can provide the report number so that I may add this information to my request of the Department of Commerce.—R. E. Thomas, Huntington Alloy Products Div., The International Nickel Co., Inc., Huntington, W. Va.

▪ **The report number is: #60-90. —Ed.**

Tough Job

Sir—Your editorial "Running a Business: It Gets Tougher Every Day", published in The IRON AGE, April 28, was outstanding, and we would like to get twelve copies of it.—J. M. Roth, Pres., Elgin Salvage & Supply Co., Inc., Elgin, Ill.

▪ **Copies are on the way.—Ed.**

With Pay

Sir—Last week's editorial "Running a Business: It Gets Tougher Every Day", certainly was well written and covered a subject that hits home on the problems of operating a small concern.

We employ approximately 90 employees and I had copies made of the editorial and placed them in each pay envelope.

I feel that many of your editorials are well worth being posted or circulated to the employees in order to make them aware of the problems that are developing.

Maybe by suggesting to other concerns what we are doing, your efforts in writing these vital editorials will have greater coverage and help solve the problems you are bringing to our attention.—G. T. Baggott, Pres., Crescent Metal Products, Inc., Cleveland, O.

Cutting Fluids

Sir—Almost two months late, I read the March 3 issue of The IRON AGE today. This delay is regrettable, because I would like copies of the five-part Cutting Fluids article and the supply may understandably be gone.

If available, please send two copies. I was most impressed by the direct, fundamental approach.—G. T. Link, Mfg. Tech. Service Unit, Bendix Products Div. of Bendix Aviation Corp., South Bend, Ind.

▪ **Copies are in the mail.—Ed.**

Electrode Choice

Sir—Please send me two reprints of the article "Careful Electrode Choice Vital to Good Welding" in the April 21 issue.—W. A. Tayler, Jr., Supt. Motive Power and Equipment, Columbus and Greenville Railway Co., Columbus, Miss.

▪ **Reprints have been sent.—Ed.**

"How about a quick once-over from the inside, Jack?"

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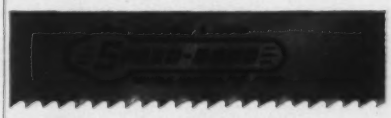

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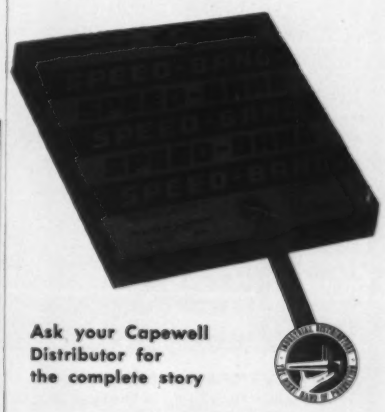

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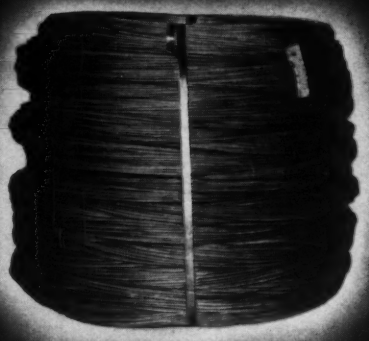

why go "local" when you can take an "express"!

LEVERPAK, the modern drum container for 12 gauge through 24 gauge, where wire must be kept clean and dry . . . and safe from handling damage. Provides long uninterrupted runs. (Finer gages than above also possible for Leverpak, on inquiry.)

Econo-Coil® Reel unwinds 1500# to 2500# *nonstop*, depending on finish and gage . . . the single length wire that slashes stop-and-go coil changing time, and cuts scrap loss as much as 90 percent! Econo-Coils® are shipped on returnable reels which stack for easy handling when full, or nest when empty to save space.

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CONTINENTAL STEEL

CORPORATION KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

FATIGUE CRACKS

A Royal Toast

You might wonder how the wedding of Great Britain's Princess Margaret and Antony Armstrong-Jones could get involved with metalworking. It's not as complex as it sounds.

The link is our man covering the 1960 Castings Congress & Exposition in Philadelphia, May 9 to 13. On the day of the wedding he attended a pre-show get-together for visiting British foundrymen. The host, British consul Raymond Jones, (not related to the bridegroom) naturally proposed a toast to the happy couple.

Those present — British and American—joined him gladly. Extending the hands across the sea attitude all the way our man's beverage was traditionally English—Scotch and soda.

Something for All

In the early years of the metalworking industry, many of the companies were family enterprises. And most of the employees were members of the family.

But as the industry grew, the family owned and operated firm began to disappear until today there are but a few left.

Still Going — However, in the mail last week we got a report that one is still in business. The letter was from the Suffolk Welding & Repair Co., Huntington Station, N. Y., and went like this:

"Gentlemen: May we please have a reprint of the article, "Careful Electrode Choice Vital to Good Welding." (See IRON AGE, April 21, P. 145).

Valuable Information—Ours is a family business and the whole family, husband, Karlo Waisane, wife Lyda, and son, William (age 16) all look forward to your magazine every week. We find so much valuable information for our own work and it keeps us up on what is going on in other branches of industry.

I turn first to the editorial page to see what Tom Campbell has to say. I always feel somehow reinforced for the day ahead after reading his timely articles."

It was signed by Mr. Waisane. A copy of the article he wanted is on the way.

Up and Over

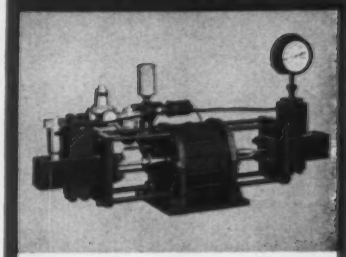
Metalworking played a part in the recent pre-Olympic events during the Penn Relays at Philadelphia.

As the pole vaulters started down the runway the crowd was silent. As they started up toward the cross bar the people in the stands strained with them. And when they went over, a loud roar filled Franklin Field.

But, alas, not all the vaulters made it up and over. Each time some aspiring Olympian knocked the bar down, a Yale and Towne lift truck was used to raise it again to its position on the standards. And it had plenty of work as the height got higher and higher, up to 15 ft.

And if the high jump record keeps getting bettered at the rate it is presently, they'll probably be using a lift truck for that, too.

ALDRICH
AIR-DRIVEN HYDRAULIC PUMPS



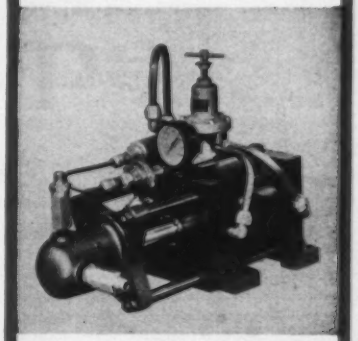
For production service: Heavy duty 6-inch stroke pump, single or double acting.

For production or laboratory . . . handling small volumes of fluid at pressures up to 50,000 psi.

For hydrostatic testing . . . tubing, valves and pressure vessels.

For operating hydraulic presses, cylinders and valve positioners.

Immediate shipment from factory stock.

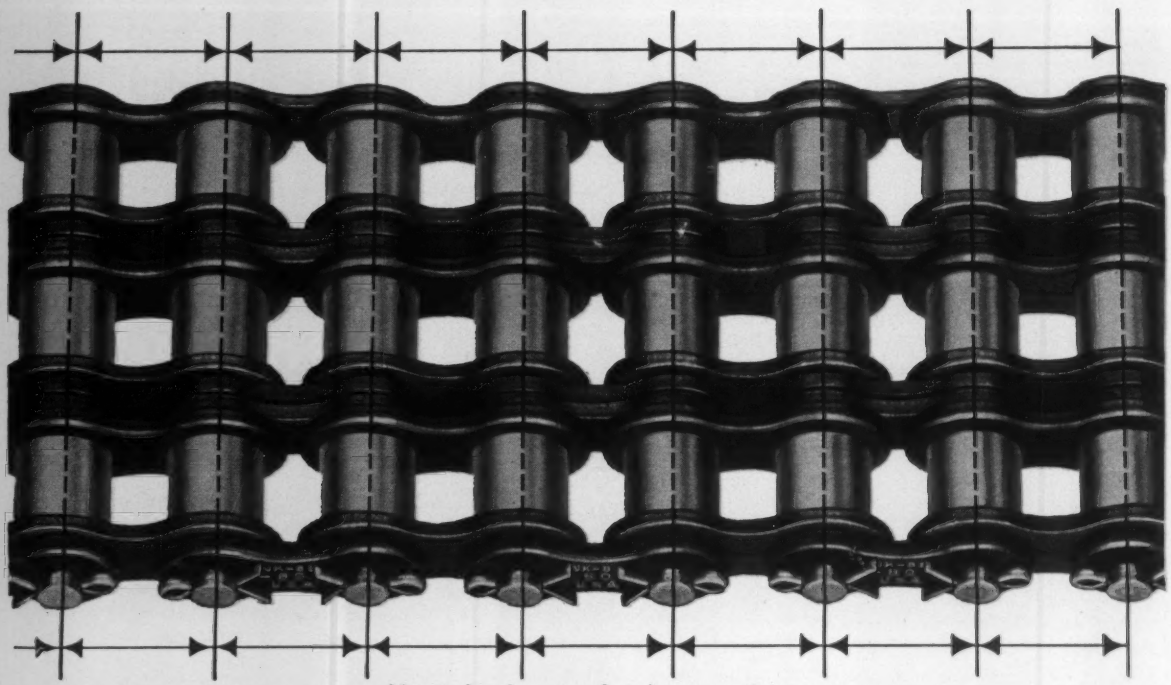


For intermittent service: 3-inch stroke pump has low first cost, high reliability.

Aldrich air-driven hydraulic pumps operate on normal plant air. They are compact, simple to install, economical to operate. Write today for Data Sheet 36 (6-inch stroke) or Data Sheet 36A (3-inch stroke).

ALDRICH

ALDRICH PUMP COMPANY
8 PINE STREET, ALLENTOWN, PA.



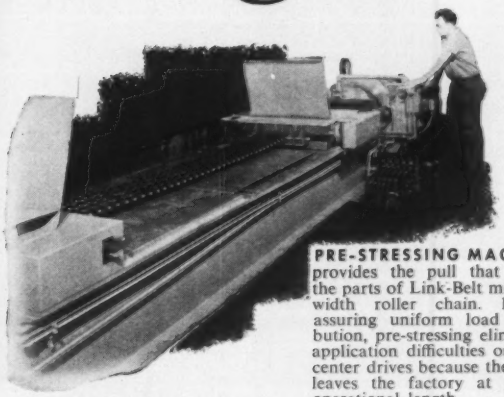
Precision controlled link pitch throughout
LINK-BELT roller chain means

equal length... equal strength

How pre-stressing ensures uniform load distribution of multiple-width LINK-BELT roller chain

Pre-stressing is one of the reasons why Link-Belt multiple-width precision steel roller chains easily handle the grueling loads common on today's drives. It seats and cold works the chain joint parts, assuring equal load distribution across the chain, minimum initial elongation, increased fatigue life.

Pre-stressing is just one of many "extras" that contribute to the *greater dynamic strength* of Link-Belt roller chain. Others include: close heat-treat control, lock-type bushings, shot-peened rollers, pitch-hole preparation. For details see Book 2657.



PRE-STRESSING MACHINE provides the pull that "sets" the parts of Link-Belt multiple-width roller chain. Besides assuring uniform load distribution, pre-stressing eliminates application difficulties on fixed center drives because the chain leaves the factory at precise operational length.

BOOK 2657 has 154 pages of roller chain data. Contact your nearest Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.)

LINK-BELT

ROLLER CHAINS AND SPROCKETS

15,361

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

COMING EXHIBITS

Design Engineering Show — May 23-26, Coliseum, New York. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

New England Material Handling Show—June 6-8, Commonwealth Armory, Boston. (Material Handling Institute, One Gateway Center, Pittsburgh 22.)

Production Engineering Show—Sept. 6-16, Navy Pier, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Machine Tool Exposition—Sept. 6-16, International Amphitheatre, Chicago. (National Machine Tool Builders Assn., 2139 Wisconsin Ave., Washington 7, D. C.)

Iron & Steel Show—Sept. 27-30, Cleveland Public Auditorium, Cleveland, O. (Association of Iron & Steel Engineers, 1010 Empire Bldg., Pittsburgh 22.)

Die Casting Exposition & Congress—Nov. 8-11, Detroit Artillery Armory, Detroit. (The Society of Die Casting Engineers, 19382 James Couzens Highway, Detroit 35.)

MEETINGS

MAY

American Institute of Industrial Engineers—National conference and convention, May 12-14, Sheraton-Dallas Hotel, Dallas, Texas. Information: A.I.I.E., P. O. Box 7306, Inwood Station, Dallas, Texas.

Steel Service Center Institute—Annual meeting, May 15-18, The Fontainebleau Hotel, Miami Beach, Fla. Institute headquarters, 540 Terminal Tower, Cleveland.

Copper & Brass Research Assn.—Annual meeting, May 15-18, The Homestead, Hot Springs, Va. Association headquarters, 420 Lexington Ave., New York.

American Coke & Coal Chemicals Institute—Eastern regional meeting, May 16-17, The Westchester Country Club, Rye, N. Y. Institute headquarters, 711 Fourteenth St., N. W., Washington, D. C.

Aircraft Industries Assn. of America—Spring meeting, Board of Governors, May 18-20, Williamsburg, Va. Association headquarters, 610 Shoreham Bldg., Washington, D. C.

Electronic Industries Assn. — Annual convention, May 18-20, The Pick-Congress, Chicago. Association headquarters, 1721 DeSales St., N. W., Washington, D. C.

National Assn. of Purchasing Agents—Annual international convention and Inform-A-Show, May 22-25, The Biltmore Hotel, Los Angeles. Association headquarters, 11 Park Place, New York.

Industrial Heating Equipment Assn., Inc.—Annual spring meeting, May 22-25, The Homestead, Hot Springs, Va. Association headquarters, 1145 19th St., N. W., Washington, D. C.

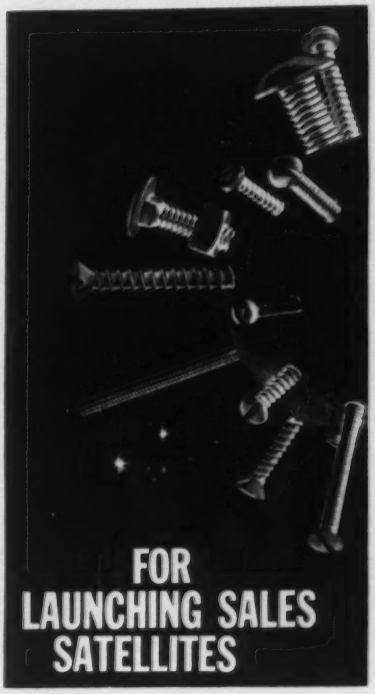
Aluminum Wares Assn. — Annual meeting, May 23-24, Greenbrier, White Sulphur Springs, W. Va. Association headquarters, First National Bank Bldg., Pittsburgh, 22, Pa.

American Supply & Machinery Mfrs. Assn., Inc.—Triple industrial supply convention, May 23-25, Chicago. Association headquarters, 2130 Keith Bldg., Cleveland.

Magnesium Assn.—Annual membership meeting, May 23-27, London, England. Association headquarters, 122 E. 42nd St., New York.

American Iron and Steel Institute—General meeting, May 25-26, Waldorf-Astoria Hotel, New York. Institute headquarters, 150 E. 42nd St., New York.

Wire Reinforcement Institute—Annual spring meeting, May 30-31, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, National Press Bldg., Washington 4, D. C.



STANDARDIZE
100%
ON SOUTHERN
FASTENERS

.. you're making sales plans for a new model or new product soon to be launched into orbit, Southern fasteners will help assure its success.

Southern specializes in the manufacture of standard fasteners. Top quality materials and workmanship are combined to produce the most dependable production fastener your money can buy. Burr-free heads and durable threads help step up driving speed in assembly, and thus costly down-time, rejects and injured materials are reduced.

Order USA-made Southern fasteners today. Call your nearest Southern distributor, or write direct to factory: Southern Screw Company, P.O. Box 1360, Statesville, N. C.

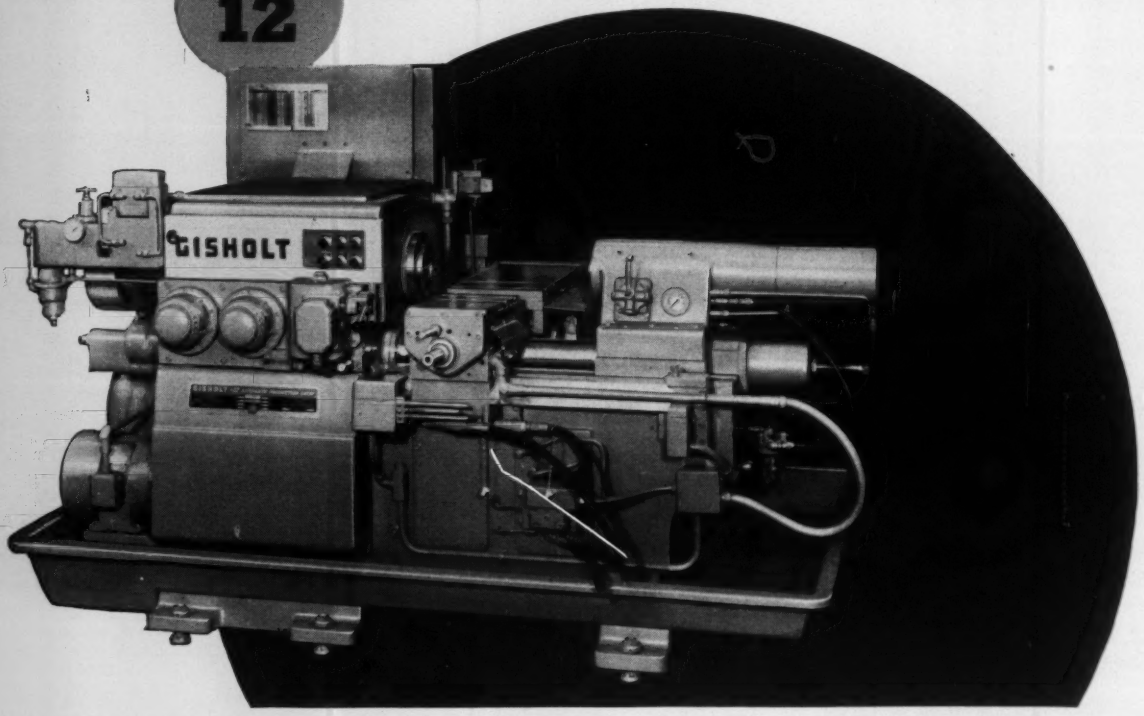
Manufacturing and Main Stock in Statesville, North Carolina

WAREHOUSES:
New York • Chicago • Dallas • Los Angeles

Machine Screws & Nuts • Tapping Screws • Stove Bolts • Drive Screws • Carriage Bolts • Continuous Threaded Studs • Wood Screws

Southern
SCREW COMPANY
STATESVILLE • NORTH CAROLINA

GISHOLT NUMBER 12 AUTOMATIC CHUCKING LATHE



Unequaled in its size range, in versatility, speed and low-cost production

Whether it's for continuous operation in mass production or a wide variety of parts in small lots, this machine is in a class by itself.

Faster automatic cycle. The No. 12 is a fully automatic chucking lathe, capable of performing all types of machining operations in rapid sequence. With 420 spindle speeds ranging from 40 to 2600 r.p.m. and an infinite selection of feeds, it meets every requirement for stock removal, finish and minimum f.t.f. time.

Complete range of accessories. Front, rear, auxiliary and overhead slides can be applied; angular cuts are easily made; JETracer of single- or multiple-pass types can be used. Automation can be incorporated—from simple loading and unloading to gaging and sorting of finished pieces.

Greater power and rigidity. Here, too, is the power (up to 40 h.p.) with rigidity to take full advantage of the newest tooling and the heaviest cuts without vibration.

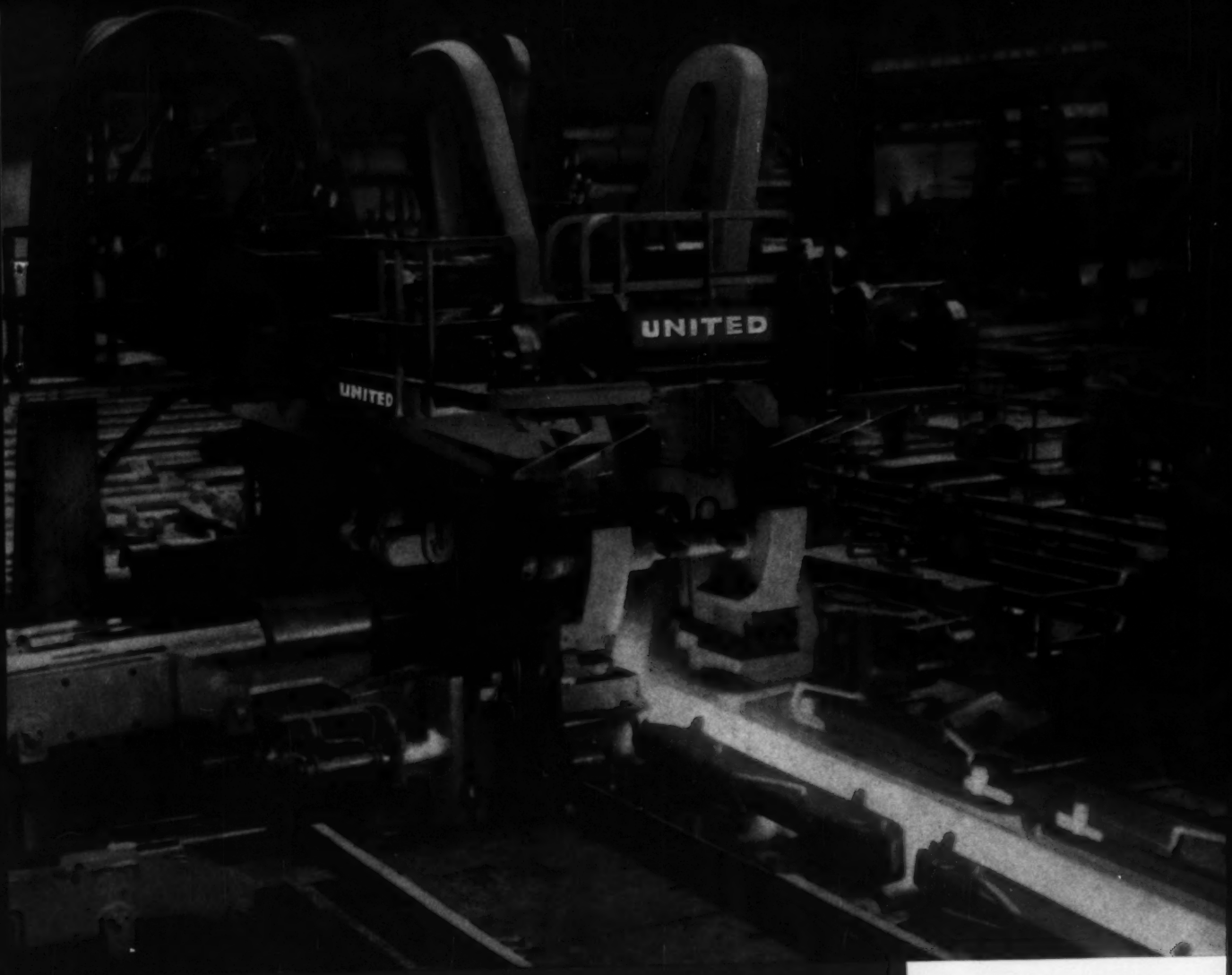
Boosts operator productivity. It requires a minimum of operator skill and attention—allows him to handle additional machines.

With all its speed and ruggedness, the No. 12 has the extreme flexibility of motions to handle practically any machining job on parts up to 16½" in diameter. It delivers high production with consistent accuracy and less dependence than ever on operator skill.

Ask your Gisholt Representative or write for Bulletin 1213, just off the press.

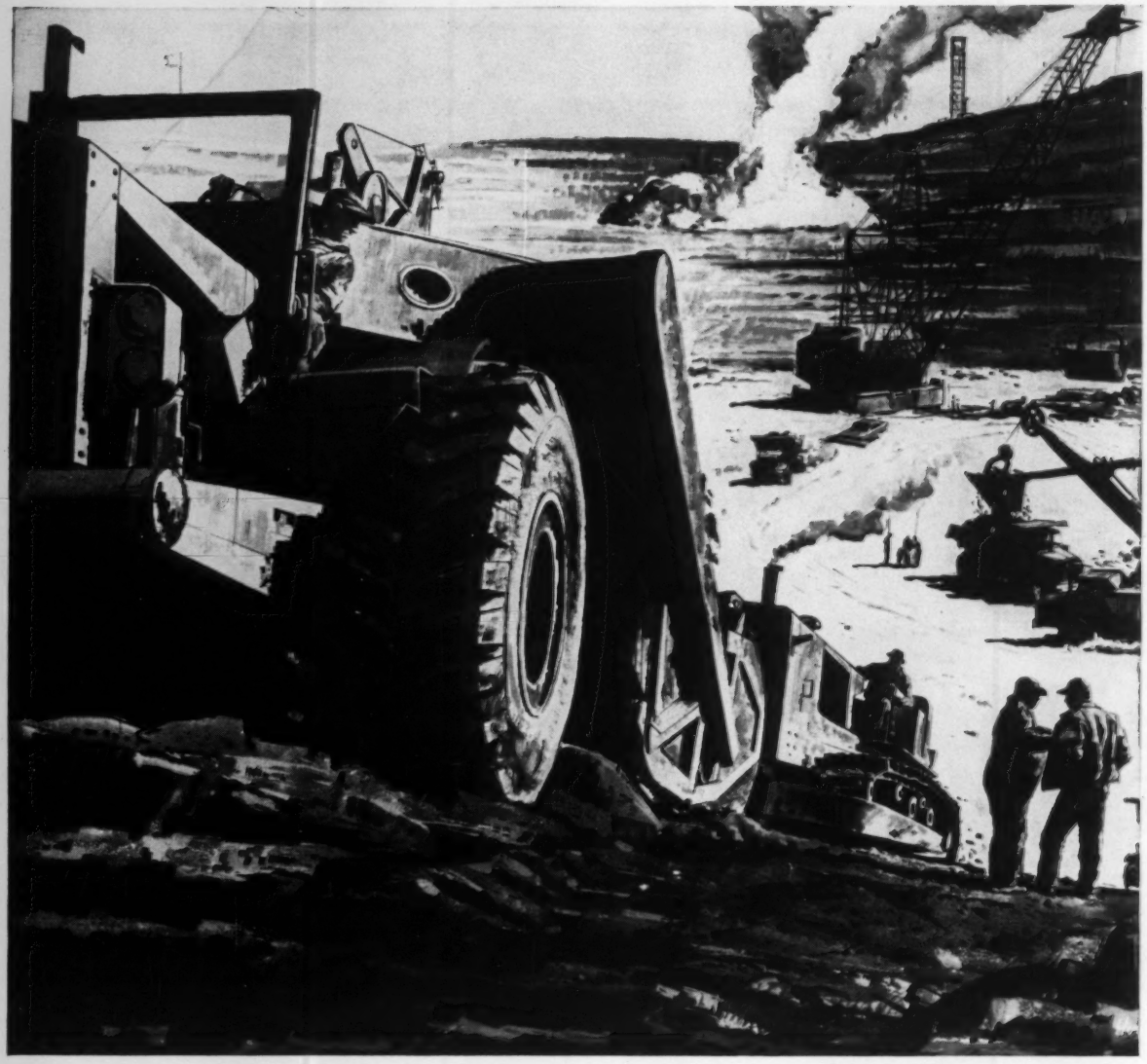
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Investigate Gisholt's Extended Payment and Leasing Plans



UNITED

UNITED ENGINEERING AND FOUNDRY COMPANY

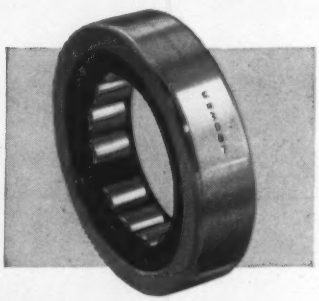


PAYLOAD . . . tons at a gulp on Bower Roller Bearings

They call it strip mining . . . where payload is king and "don't spare the rig". Take this scraper: aided by a rugged 'dozer, it's pushloaded in mere minutes. Then, with tons of rock and earth on its back, it takes off cross-country . . . dumps the load . . . hustles back for more.

Bruising bouts like this often go on 24 hours a day, put an incredible strain on equipment *and on bearings*. Yet today's bearings—*particularly those by Bower*—more than meet the task. Their basic design advantages, coupled with fine materials and precision manufacturing, have earned them a reputation for long service under the most severe conditions. And with rarely a shutdown for maintenance.

If you produce a product that uses bearings, specify Bower. You will find this extra measure of service in the full Bower line of tapered, cylindrical and journal roller bearings for every field of transportation and industry. Bower Roller Bearing Division, Detroit 14, Michigan.



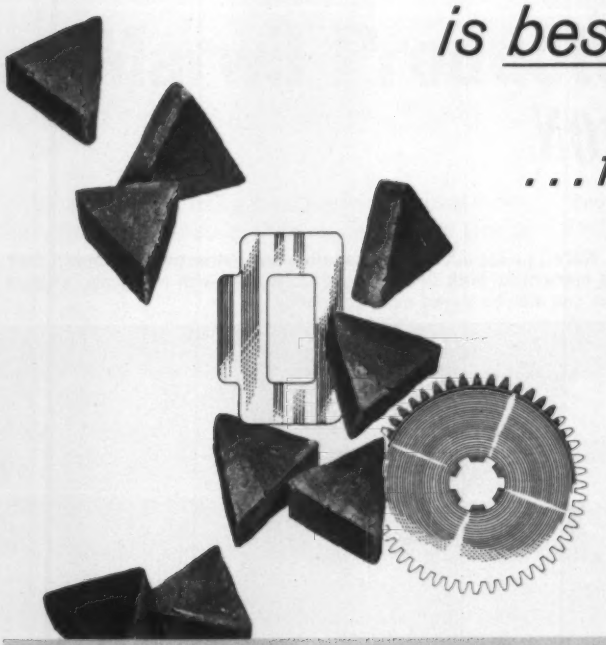
BOWER
ROLLER BEARINGS

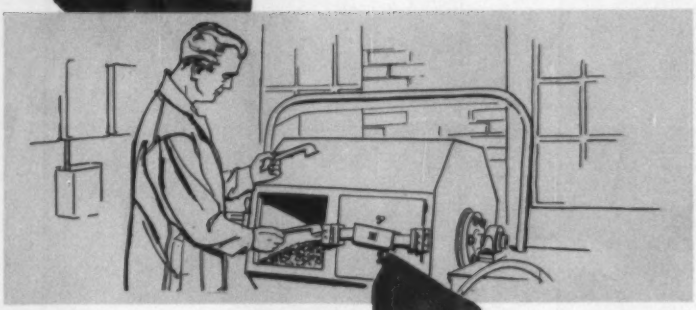
tapered
cylindrical
journal

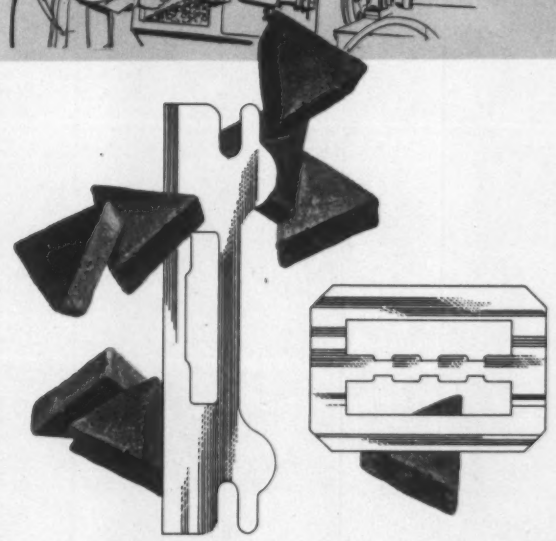
DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.

Barrel finishing is best finishing

. . . for many jobs use TUMBLEX "T"*







Don't let old-fashioned hand-finishing waste your production time and money.

Cut your cost-per-piece-produced by choosing the right barrel finishing equipment.

Cut this cost to very lowest by choosing the right Norton TUMBLEX *abrasive . . . available in five types and many sizes . . . engineered for best results covering the range of barrel finishing.*

For finishing intricate parts, TUMBLEX "T" abrasive comes in triangular, non-wedging shape. It is made of bonded ALUNDUM* abrasive, assuring "Touch of Gold" performance that includes long, even wear; fine, uniform finish; short time cycles and sure savings.

Send samples of parts you finish to our Sample Processing Department. We'll barrel finish, return samples, and report the methods and abrasive you need to improve quality and cut costs. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES

G-392

75 years of . . . Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEBR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

CF&I Heavyweight Shaped Coils

PACKAGED for YOUR PRODUCTION

Mr. Marwil points out in-plant handling and unloading is more efficient and economical with CF&I Shaped Coils than with mill coils. Shaped coils can also be stored more compactly.

give long production runs at Marwil Products Co.

With a 12 million unit annual capacity, Marwil Products Co., Fort Loramie, Ohio, is rated as the largest U. S. manufacturer of muffler clamps and U-bolts. Nine months ago the company switched to CF&I Wire. Mr. William Marwil, Vice President tells why:

"We find CF&I's 2000 lb. shaped coils of clean, bright basic wire are very uniform, with no 'thin' areas or rough finish. These large coils give us longer runs without the necessity for frequent set-ups on our Lewis Cut Off machines."

In addition to the high quality of CF&I Wire, new packaging methods have increased the preference for CF&I Wire.

Replacing small, light-weight coils are CF&I Shaped Coils and spiders. The spider, leased from CF&I, acts like a spool, and pays off the wire evenly and smoothly. Now, instead of losing hours of production time every day in changing small coils or unravelling tangled wire, *one* CF&I Shaped Coil can usually last many hours. The shaped coils and spiders make for easier handling and storage, too.

One of our salesmen will be glad to recommend the right "package" to increase your production and cut manufacturing costs. You can call your nearest CF&I sales office today and arrange a "no obligation" visit.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

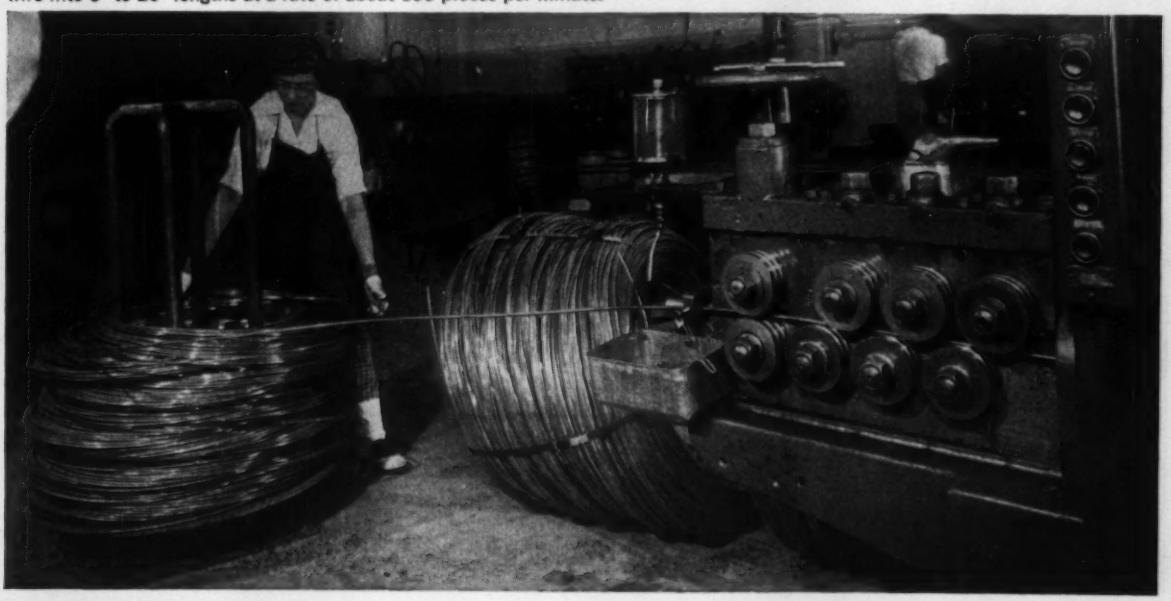
7348

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Farmington (N. M.) Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco San Leandro • Seattle • Spokane • Wichita

In the East: **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

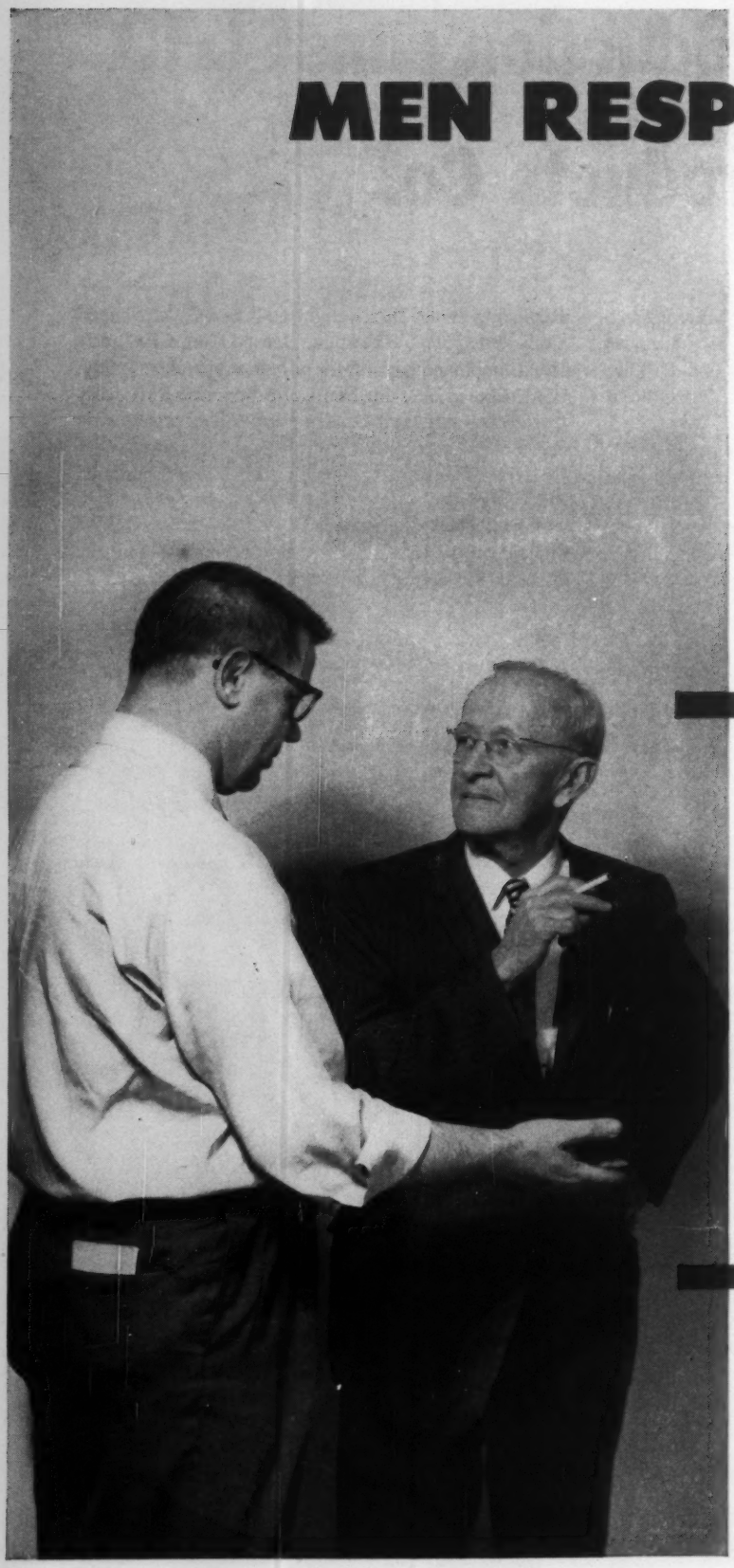
CF&I OFFICE IN CANADA: Montreal • **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg

CF&I Wire being fed into the Lewis Cut Off machine. This machine cuts wire into 5" to 20" lengths at a rate of about 150 pieces per minute.

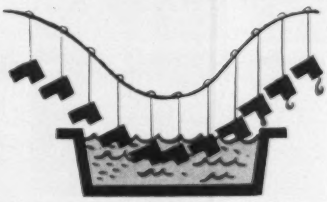


MEN RESPONSIBLE

another



METAL CLEANERS



Newest in the well-known Houghton Line is the versatile and economical Cerfa-Kleen series . . . four new, more efficient metal cleaners to handle most any cleaning problem. Included are powerful new room temperature cleaners which require no special equipment or added operating costs.

FOR METAL CLEANING...

group that knows how much HOUGHTON KNOW-HOW helps!

In The Houghton Line, there's a full range of new, as well as old, established products to solve most any metal cleaning problem. But *making* these products is only half the Houghton story.

More important is Houghton's ability to make them *work for you* . . . job-tailoring each to fit your particular application. Most important, Houghton gives you the benefit of 96 years' experience and research in many areas of metalworking to help solve the immediate problem in yours. That's the unique niche Houghton has carved for itself all over the world. And it's one where our leadership has never been challenged.

Near you there's a Houghton Man whose broad metalworking know-how and on-the-job-'til-it's-done service is yours with every item in The Houghton Line. He's a good man to have on your team. Call him or write E. F. Houghton & Co., 303 West Lehigh Avenue, Philadelphia 33, Pennsylvania.

RUST PREVENTIVES

More than 100 varieties for any industry requirement. All are sold under the world-famous Cosmoline and Rust Veto labels. Included are dry film solvent types, oil solvent types, fingerprint neutralizers, oil and grease types of corrosion preventives, and concentrates for economical plant dilution.

CHEMICAL CONVERSION COATINGS

In Houghton's surface conditioning family are materials that clean and phosphate in one operation . . . salts to blacken steel . . . chemicals that provide a phosphate coating to improve bonding characteristics of metal An important feature of each is their simplicity.

ON-THE-JOB SERVICE...

. . . the most valuable help Houghton can give you. More than 100 Houghton sales engineers are backed by skilled laboratory and field technicians, all experts in their fields. Our 96-year reputation rests on the ability and integrity of these men who are truly your Partners in Production.

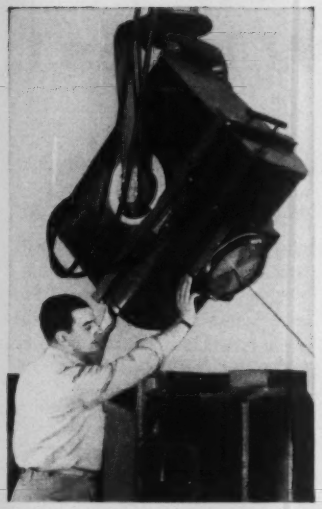
Industry's Partner in Production

E. F. HOUGHTON & CO.

Philadelphia, Pa. • Chicago, Ill. • Carrollton, Ga. Detroit, Mich. • San Francisco, Calif. • Toronto, Canada

MEN WHO KNOW
FACILITIES,
CAPACITY AND
EXPERIENCE, BUY . . .

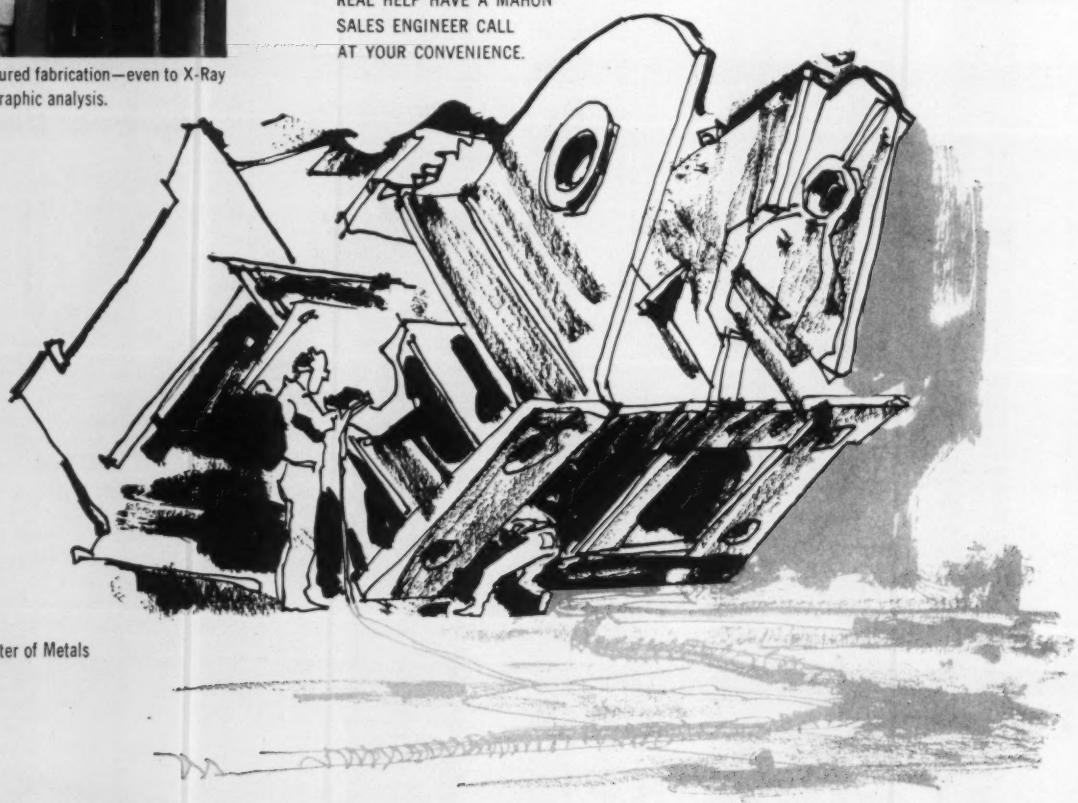
"fabrication by Mahon"



Quality-assured fabrication—even to X-Ray and Radiographic analysis.

Mahon's Steel-Weld Division has the metalworking facilities and the proven ability to take your fabricated-steel work—either mechanical or structural—from drawing to finished project. Facilities of the Mahon plants include all types of welding equipment backed by machining, assembling, testing, painting and other allied functions. Welded steel gives your designs greater strength at less weight . . . advanced techniques plus 'old-time' skill means a better product . . . and a single-source responsibility offers less delay, lower costs. For you, "Fabrication by Mahon" is an assurance of quality and service—competitively priced. On heavy, large-dimension work in particular, Mahon is unmatched.

WRITE TODAY FOR STEEL-WELD LITERATURE OR FOR REAL HELP HAVE A MAHON SALES ENGINEER CALL AT YOUR CONVENIENCE.



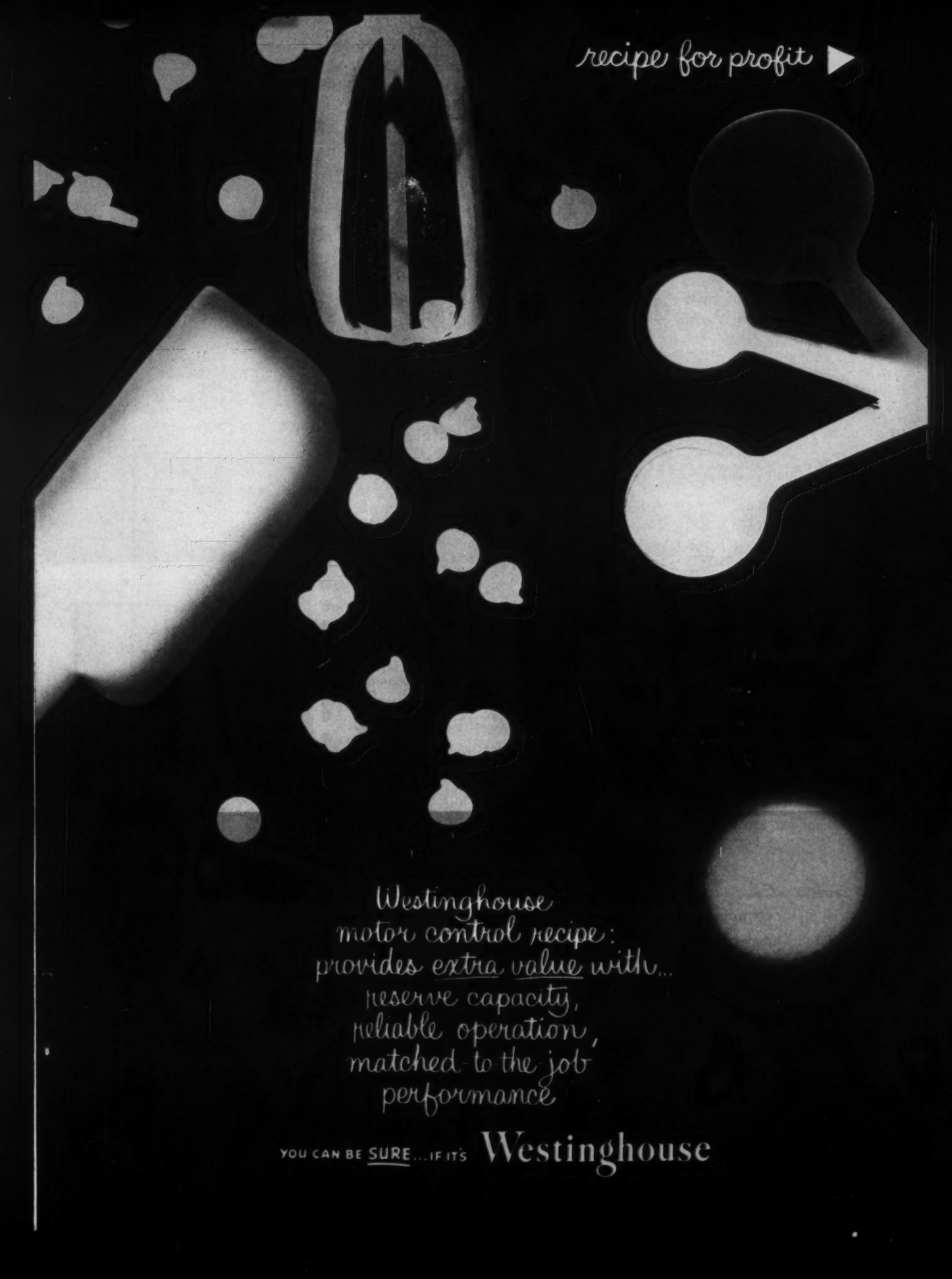
Mahon-Master of Metals

THE R. C. MAHON COMPANY • DETROIT 34, MICHIGAN

Manufacturing Plants—Detroit, Michigan and Los Angeles, California

SALES OFFICES/or Representatives Located in All Principal Cities

M A H O N


recipe for profit
Westinghouse
motor control recipe:
provides extra value with...
reserve capacity,
reliable operation,
matched to the job
performance
YOU CAN BE SURE... IF IT'S Westinghouse

TESTED RECIPES FOR PROFIT . . .

Westinghouse blends "hidden" ingredients in extra value controls for profitable plant operations

- Quality control
- Design ability
- Quality components
- Application experience
- Manufacturing know-how
- Maintenance facilities
- Extensive research

How does Westinghouse handle this basic control recipe to make the result superior to any other? The best chef knows that the quality of the ingredients used and the mixing knack account for the blue-ribbon winners.

At Westinghouse, highest quality control components plus a large portion of expert manufacturing skill, craftsmanship and experienced know-how are carefully blended. Such "hidden" ingredients mean industrial motor controls with reserve capacity to handle overloads . . . long, trouble-free service . . . and performance custom-matched to your needs. Qualities that give **more control value for your money.** Qualities more than sufficient to meet today's demands for extraordinary reliability. That's why it pays to look beneath the surface of any control to be sure you are getting Westinghouse quality.

Your local Westinghouse representative is ready with a wide selection of industrial motor controls. Ask him to tell you more about their **hidden values** . . . benefits by the baker's dozen . . . for more profitable plant operations.

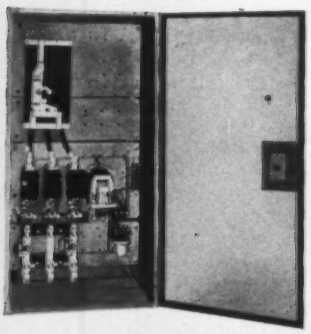
The proof of Westinghouse controls is in their using!

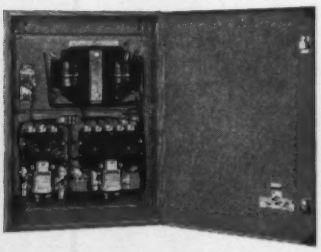
Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

Check your favorite chef's best dish. The recipe calls for the finest ingredients. However, real success comes from devoted attention to details. Superior product quality, likewise, requires premium components and craftsmanship.





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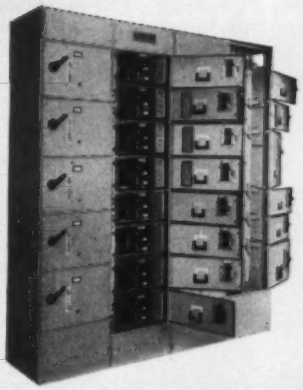


Control Centers

Compact grouping of all motor controls
- cuts installation time;
- frees production areas;
- permits easy one-man control supervision;
- speeds maintenance and service.

Interchangeable modular construction.

DESIGN TESTED AND PROVED in the Westinghouse HIGH POWER LABORATORY

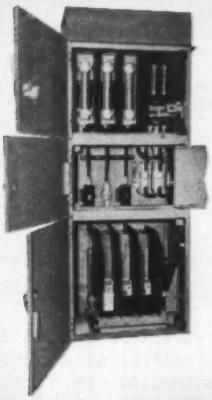
Life-Line® Starters

Full-voltage, a-c magnetic starters in all NEMA enclosures.

Time-tested components . . . straight-through wiring, front-accessible parts combine to slash installation and maintenance costs.
- proved De-ion® arc quencher increases contact life . . .
- silver plated interchangeable contacts . . . clapper-type operating mechanism . . . smaller compact designs.

Single phase or polyphase; up to 600 volts — reversing or non-reversing;

Non-combination or combination with disconnects or circuit breakers.



Ampgard* High-Voltage Starters

Maximum protection for motors, systems and personnel.

Faults interrupted in less than ½ cycle . . . isolates fault to prevent shutdown of other equipment.

Completely front accessible.

Externally operated line isolating switch.

Exclusive mechanical and electrical interlock . . . prevents switch operation under load; automatically stops motor when cabinet is open.

Full line available . . .
for squirrel-cage, wound-rotor and synchronous motors up to 3000 hp — up to 5000 volts.

* Trade-Mark

Reduced Voltage Starters

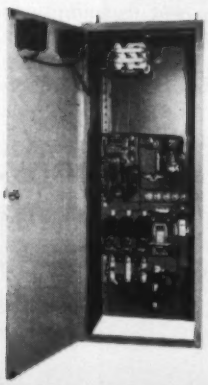
Widest possible selection of primary resistor, auto-transformer, part-winding and star-delta types for squirrel-cage, wound-rotor and synchronous motors in all hp ratings — up to 600 volts.

Manual and magnetic starters to provide the proper starting characteristics for any application.

Available with integral circuit breaker or disconnect switch — fused or non-fused.

Enclosures available for every need . . .
- general purpose . . . dust-tight industrial . . .
- watertight . . . explosive atmospheres.

Available for immediate delivery.



Static Slipsyn® Synchronous Motor Control

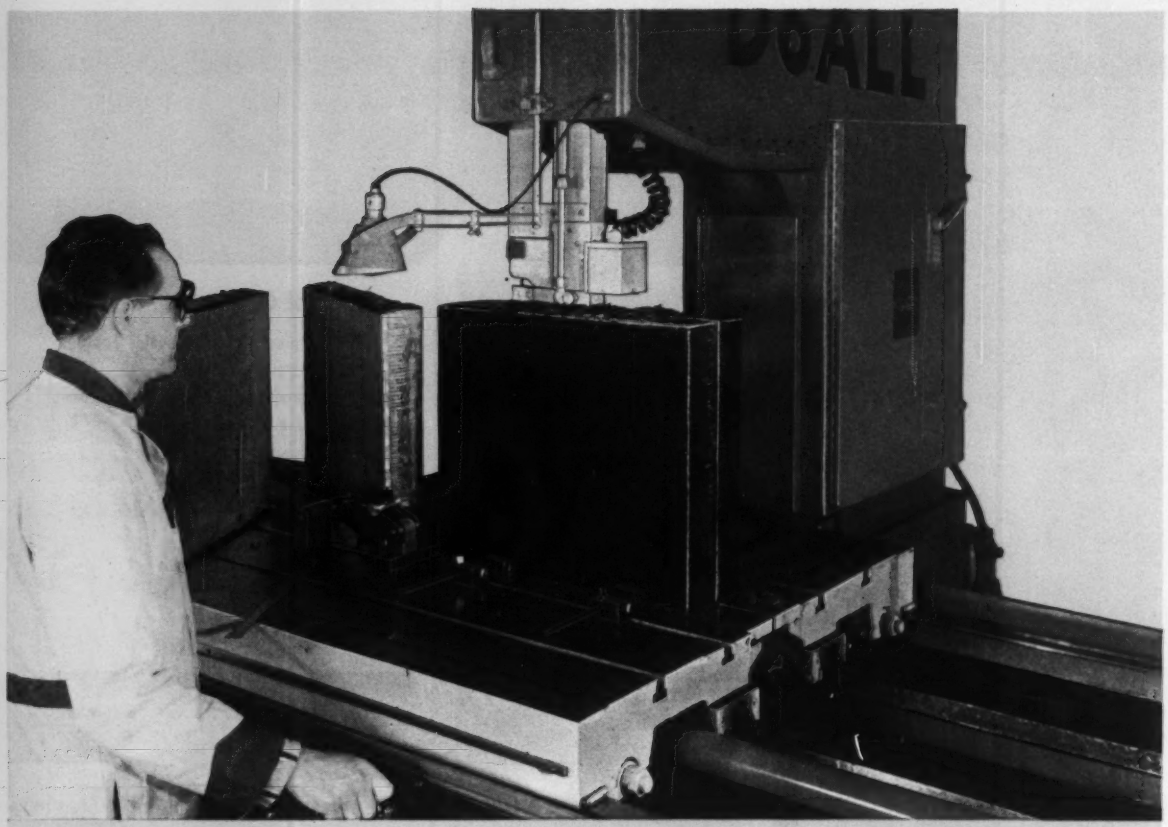
Static transistor circuit guarantees . . . maximum reliability and accuracy; no moving parts to wear, corrode or fail; unaffected by contaminated atmosphere.

Motor field excitation applied at precise speed and pole position.

Adjustable pull-out protection, permits immediate detection or delays action to eliminate false tripping caused by transients.

Available as complete starter or field conversion unit for **any make** control!

J-25004-3



Half-Ton Slabs of Tough Analysis Steel Split in ½ Hour on DoALL Band Mill

This DoALL band mill makes light work of heavy sawing jobs. It offers a new, fast, low-cost way to machine king-size workpieces—accurately and with excellent finish.

Seven large blocks of tough, special analysis steel, each 19¾ in. x 23 in. x 7 in. and weighing 1,000 lb., were split at a cutting rate of 5 sq. in./min. Despite this fast cutting rate, flatness was held within .010 in. T.I.R., using a Demon® h.s.s. saw band and DoALL No. 240 cutting oil. After seven cuts, or approximately 3,180 sq. in., there was no appreciable wear on the saw band.

The large-capacity, variable-speed fluid drive worktable of the DoALL band mill supports workpieces weighing up to 4,000 lb.—with positive feeds from .03 to .80 in./min. Fixturing and power consumption are lower in cost than found in any other machining method.

To increase your productivity, investigate this money-saving, money-making machine today. Call your local DoALL Sales-Service Store.

All machine functions of the DoALL band mill are controlled from the station shown above. Additional controls are located on the column.

B-64

This is a typical DoALL Store

The DoALL Company, Des Plaines, Illinois

Call Your DoALL Sales-Service Store

Machines and Blades · Surface Grinders · Power Saws — MACHINE TOOLS · CUTTING TOOLS · MEASURING INSTRUMENTS · SHOP SUPPLIES

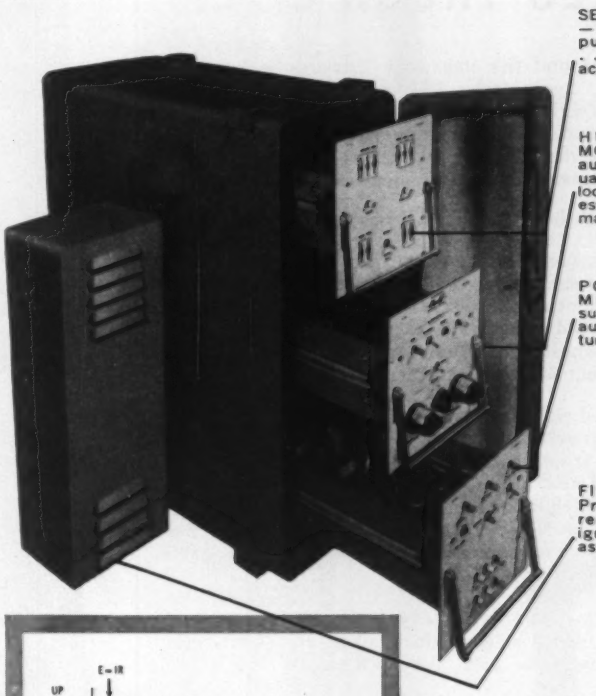
Monautronic V-2 welding control certifies weld quality... cuts rejects and production costs

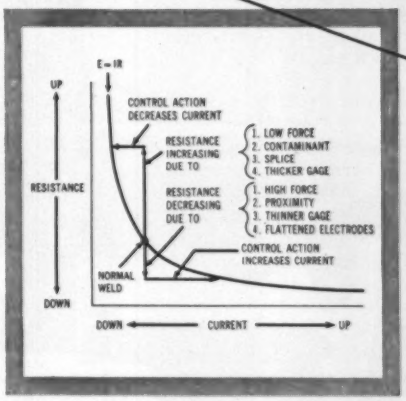
A resistance welding control that automatically compensates for every process variable

The new Monautronic V-2 welding control introduces the concept of feedback control to produce spot-welds of consistently high quality. It makes use of the latest advances in electronic computing to overcome automatically such obstacles to weld quality as line voltage fluctuation, electrode wear, variations in electrode tip force, surface finish and shunting.

The Monautronic V-2 compensates for undesirable variations usually encountered in resistance welding by maintaining voltage across a weld at a constant value. This constraint of voltage amounts to constraint of final weld temperatures, and such temperature control assures production of quality welds.

- **Automatic lockout**—occurs when process variations are so severe that the available current range would not cover the requirements for quality welding. The control detects extreme contamination, failure in the force system, overwelding, poor matching or fitup, and any other conditions that would result in substandard welds.
- **Automatic sequencing**—all provisions for single spot, roll spot or seam welding. Sequencing is 100% accurate, and exceeds NEMA standard specification 3B. Special sequence programming is available.
- **Transistorized design**—for high reliability, compactness, low power consumption.
- **Modular construction**—permits easy removal of the three modules and separate firing unit, simplifies maintenance.
- **Shock and vibration resistant construction**—for long, reliable service in even the most demanding applications.
- **Safety interlock**—for protection of personnel during tip dressing.
- **Tamperproof case**—prevents access to control by unauthorized personnel.


SEQUENCE MODULE—Utilizes digital pulse-type circuitry . . . provides 100% accuracy.
HEAT CONTROL MODULE—Contains automatic and manual heat controls plus lockout devices. Processes input information from weld.
POWER SUPPLY MODULE—Power supply plus required auxiliary safety features.
FIRING MODULE—Provides large currents needed to fire ignitrons. Supplied as separate module.



VOLTAGE CONSTRAINT

Graph shows how voltage control compensates for process variations. Any point on curved line E = IR represents a specific voltage. With normal weld as reference point, certain process variations cause increased resistance, while others cause a decrease. Control action is achieved through change of current to constrain voltage to same level for every weld.

for complete details contact: THE BUDD COMPANY
Electronic Controls Section • Philadelphia 32, Pa.

ELECTRONIC **Budd** CONTROLS

EVEN ON THIS EXTRA-TOUGH JOB...

N-A-XTRA

HIGH-STRENGTH STEEL TRIPLES TRUCK LIFE!

Hour after hour, around the clock, the Edward C. Levy Slag Company, Detroit, keeps forty 45-ton trucks working under severe conditions. Nearly 30 tons of hot slag are loaded, lifted and dumped on every trip. Each time, the truck body must stand the sudden shock of drop loading, the stress of lifting that load and the grinding abrasive action as it empties.

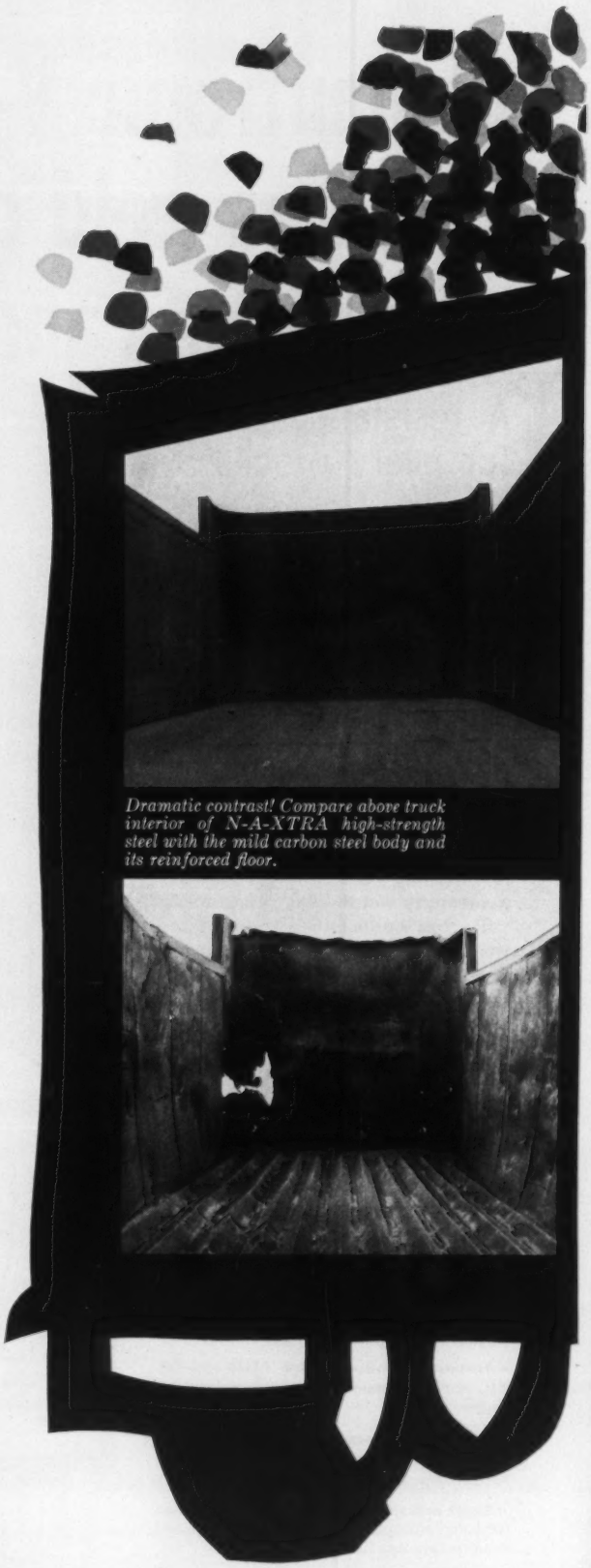
How long can a truck body take such a beating?

Until the company (which designs its own trucks) discovered N-A-XTRA high-strength steel, they used ordinary carbon steel, good for about 18 months' service. Though the truck bodies were as strong as they could be and still carry an adequate payload, maintenance was almost continuous—with breaks, dents, dings and sags occurring almost from the start.

Then they fabricated eight bodies out of N-A-XTRA, which has a minimum yield strength nearly three times greater than mild carbon steel. These trucks carry the same payload and after 18 months' service still look almost new. Owners estimate a life of five years, more than triple the others—with far less maintenance. The extra strength of N-A-XTRA also permits a strong floor that needs no expensive reinforcement to support the load against hydraulic lift action.

Eventually, all forty Edward C. Levy trucks will be made of N-A-XTRA high-strength steel. In fact, all patches and section replacements are now made with N-A-XTRA.

Tons of hot, abrasive slag may not be your problem—but the same steel that mastered these conditions is the one to remember when only the strongest steels will do. Rugged conditions, heavy loads and weight-saving construction are challenges that N-A-XTRA is designed to meet and beat. With excellent weldability, formability and toughness, these quenched and tempered N-A-XTRA steels are available in four levels of minimum yield strength, from 80,000 to 110,000 psi. They can also be supplied to higher levels of mechanical properties.



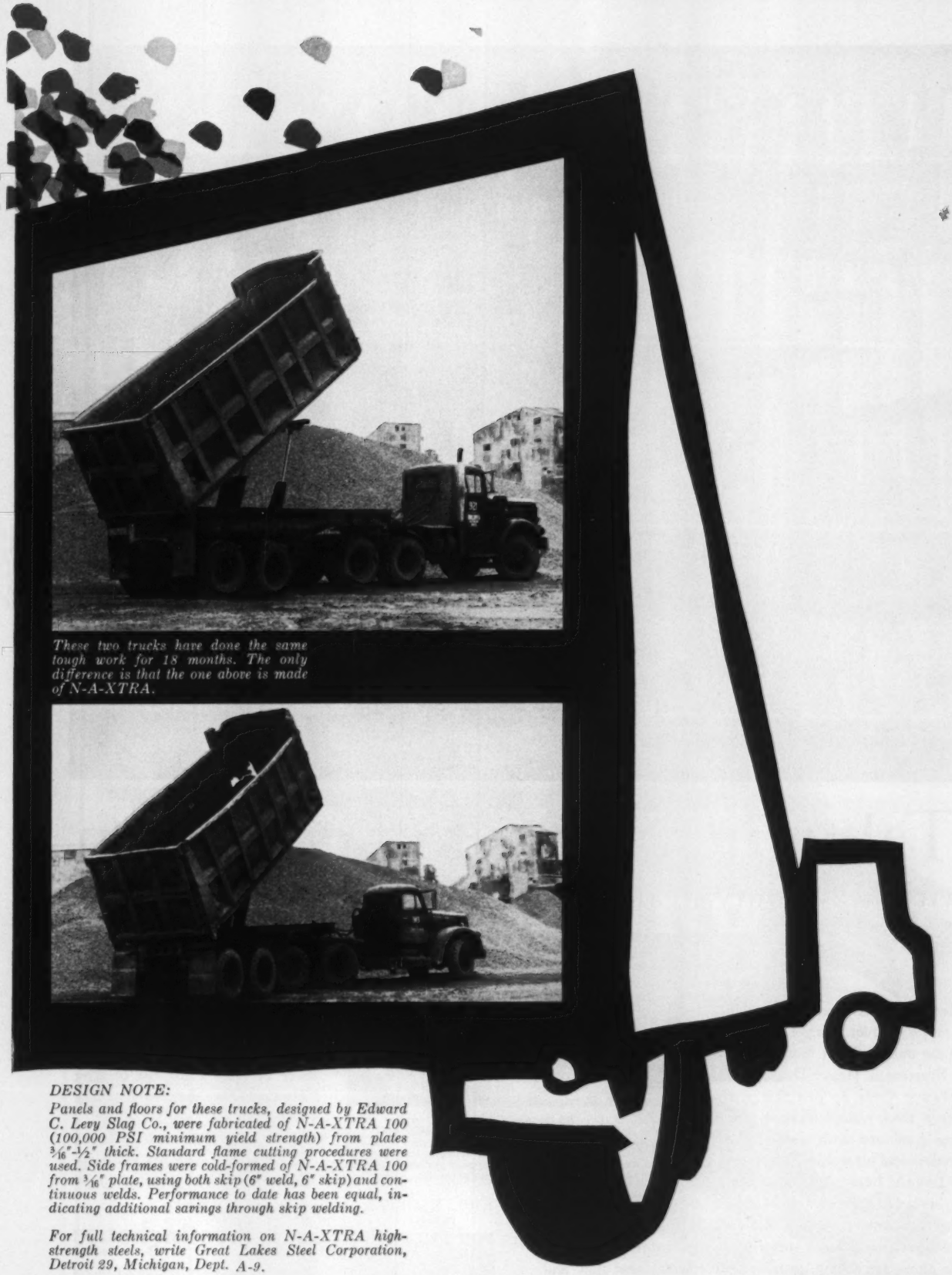
Dramatic contrast! Compare above truck interior of N-A-XTRA high-strength steel with the mild carbon steel body and its reinforced floor.

N-A-XTRA

A PRODUCT OF

GREAT LAKES STEEL

Detroit 29, Michigan



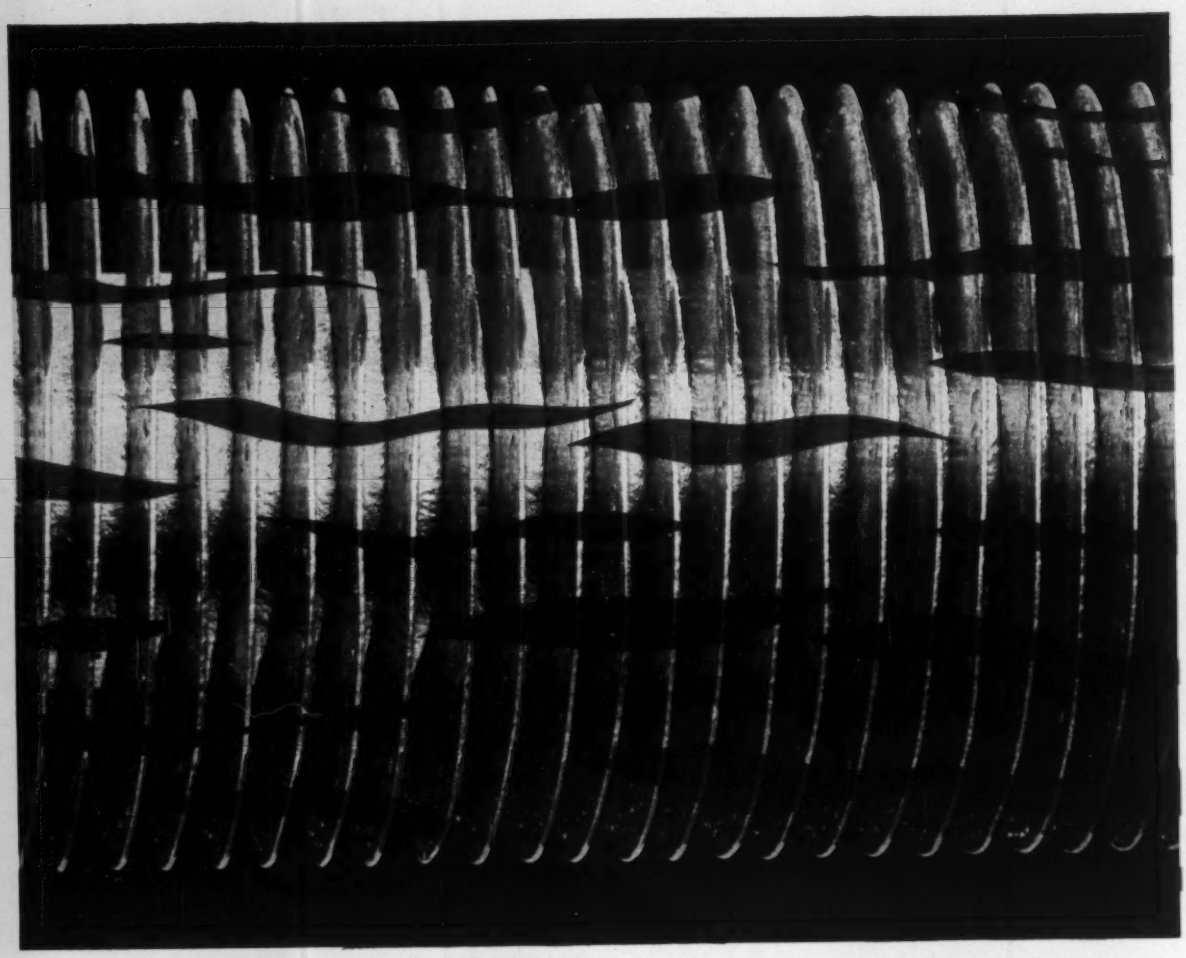
These two trucks have done the same tough work for 18 months. The only difference is that the one above is made of N-A-XTRA.

DESIGN NOTE:

Panels and floors for these trucks, designed by Edward C. Levy Slag Co., were fabricated of N-A-XTRA 100 (100,000 PSI minimum yield strength) from plates 3/16"-1/2" thick. Standard flame cutting procedures were used. Side frames were cold-formed of N-A-XTRA 100 from 3/16" plate, using both skip (6" weld, 6" skip) and continuous welds. Performance to date has been equal, indicating additional savings through skip welding.

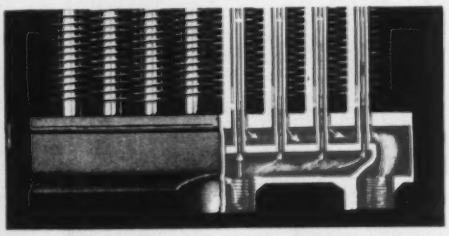
For full technical information on N-A-XTRA high-strength steels, write Great Lakes Steel Corporation, Detroit 29, Michigan, Dept. A-9.

***Great Lakes Steel is a Division of* NATIONAL STEEL CORPORATION**



Take the bite out of corrosion

with heavy duty steam heating coils in process fan systems



TYPICAL APPLICATIONS of heavy duty steam heating coils: make-up air for steel mills; calendar drying in paper mills; textile mill dryers; board dryers for building materials; synthetic rubber dryers for tire industry; process drying in food industry; meat packing smoke houses; vapor absorption systems; industrial make-up air systems; forced draft intake air heaters.

Heavy Duty is a name reserved for a *tough* product. It's got to live up to the most difficult requirements.

Sturtevant Heavy Duty Steam Heating Coils do just that with heavy thick-walled *wrought iron* pipe combined with welded steel headers and all welded joints.

Tough, heavy wrought iron resists the corrosive action of oxygen and CO_2 in the condensate, a common condition of industrial process applications.

Smooth steel fins, spirally wound, solder bonded to the pipes, are strong, provide very efficient heat flow and resist atmospheric corrosion.

This is a tested, proven Westinghouse *exclusive*. You can find out more by asking for the booklet "Heavy Duty Steam Heating Coils." It's filled with data.

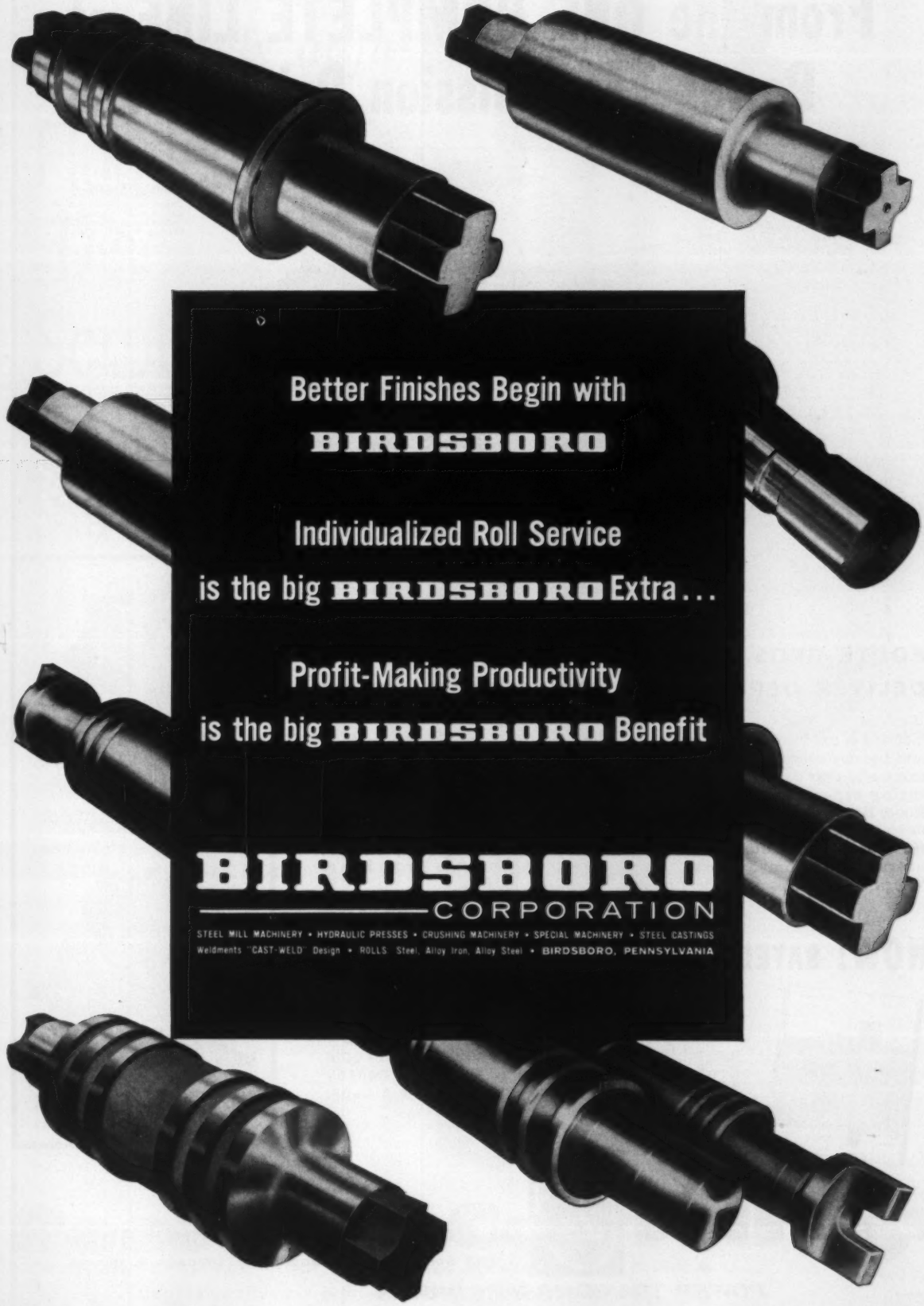
Call your Sturtevant Division Sales Engineer or write Westinghouse Electric Corporation, Dept. EI01, Hyde Park, Boston 36, Massachusetts.

YOU CAN BE SURE...IF IT'S Westinghouse

J-80701

Watch Westinghouse Desilu Playhouse on CBS-TV Alternate Fridays

Sturtevant Division fan system components include air handling, cleaning, heating and cooling products—all from a single source with a single warranty—best for service and satisfaction. Rely on Sturtevant . . . pioneers and pacesetters in air treatment for 100 years . . . 1860-1960.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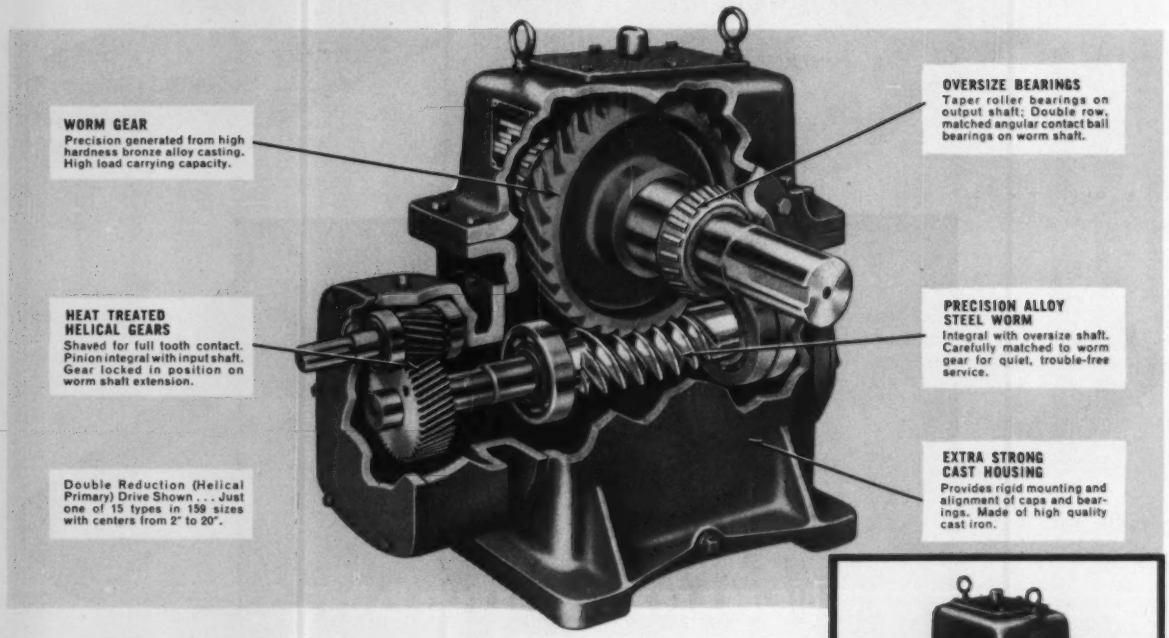
From the ONE COMPLETE LINE of Power Transmission Drives....

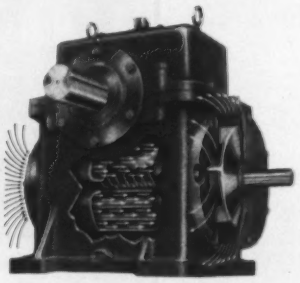

WORM GEAR
Precision generated from high hardness bronze alloy casting. High load carrying capacity.
HEAT TREATED HELICAL GEARS
Shaved for full tooth contact. Pinion integral with input shaft. Gear locked in position on worm shaft extension.
Double Reduction (Helical Primary) Drive Shown . . . Just one of 15 types in 159 sizes with centers from 2" to 20".
OVERSIZE BEARINGS
Taper roller bearings on output shaft; Double row, matched angular contact ball bearings on worm shaft.
PRECISION ALLOY STEEL WORM
Integral with oversize shaft. Carefully matched to worm gear for quiet, trouble-free service.
EXTRA STRONG CAST HOUSING
Provides rigid mounting and alignment of caps and bearings. Made of high quality cast iron.

FOOTE BROS. WORM GEAR REDUCERS DELIVER DEPENDABLE RIGHT ANGLE POWER

Gearing is the heart of any drive . . . and because more than 100 years of successful gear design and manufacturing experience go into every Foote Bros. Worm Gear Drive, they have built an unequalled reputation for performance, durability, and operating economy. Foote Bros. Worm Gear Drives are widely used in every industry in applications where dependability is a primary need.

If your drive problems involve right angle, concentric shaft, parallel shaft, or shaft mounted transmission of power, check the advantages of the complete Foote Bros. Power Transmission Line.

SINGLE REDUCTION DRIVES AVAILABLE WITH WORM UNDER OR OVER FOR HORIZONTAL OR VERTICAL MOUNTINGS.



FAN-COOLED SINGLE REDUCTION DRIVES AVAILABLE FOR HORIZONTAL OR VERTICAL MOUNTINGS.

NOW! RATED TO LATEST AGMA STANDARDS

Foote Bros. Worm Gear Drives are rated to the latest AGMA Standards. A new Catalog—HGB—just off the press, illustrates and describes Foote Bros. Worm Gear Drives. Ask your nearby Authorized Foote Bros. Distributor for a copy, or write today.

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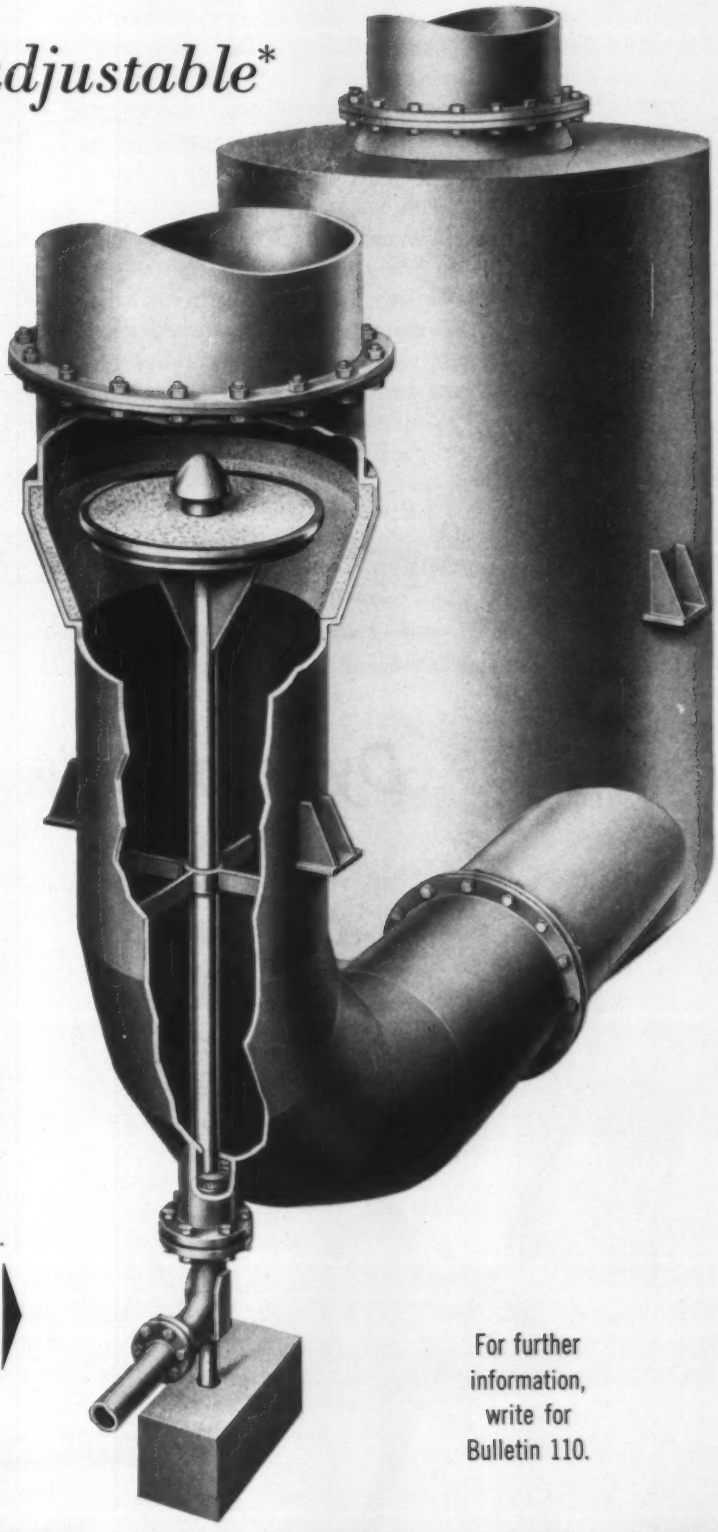
POWER TRANSMISSION DRIVES

*Completely adjustable**

Flooded Disc Scrubber

Removes Sub-Micron Fumes



The Research-Cottrell high efficiency scrubber uses the unique flooded disc principle for removing sub-micron fumes in steel-making furnaces and chemical processing.

As shown in the illustration, the outstanding feature of this scrubber is the simple, adjustable "flooded disc." The flooded disc adjusts for maximum cleaning efficiency over a wide range of operating conditions.

* *Automatic positioner immediately adjusts the disc to meet your varying gas and dust control problems.*

Research-Cottrell, with over 48 years of industrial gas cleaning experience, will be glad to consult with you on any specific problem.

For further information, write for Bulletin 110.

Research-Cottrell

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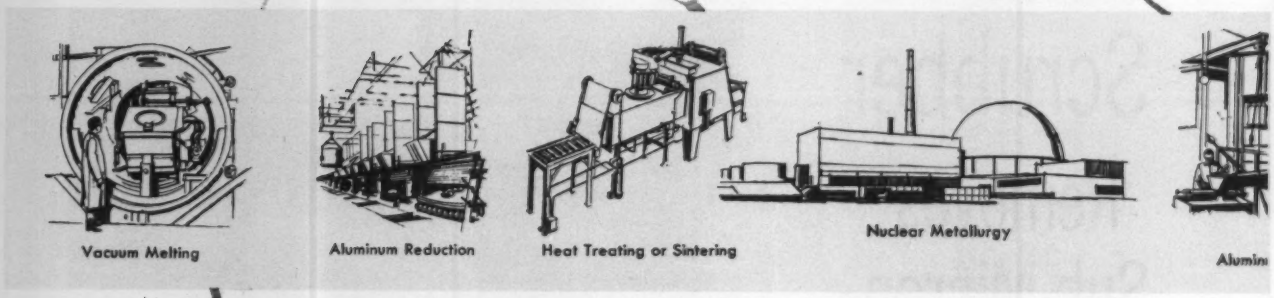
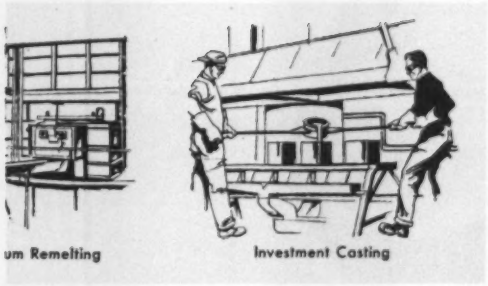
RC207



Dynamically combined to

Modern metallurgists work closely with Norton Company's "Men with the Facts" in creating better refining, alloying and processing methods. Drawing on the broad, varied range of Norton Refractories, they solve problems ranging from metal transfer for aluminum remelt to critical vacuum-melting techniques.

The advanced development of Norton Refractories and their availability in commercial quantities permit improvement of metals and metal processing throughout industry. All of the following refractories play vital roles. ALUNDUM* fused aluminum oxide for . . . melting ferrous and non-ferrous alloys . . . high temperature processing furnaces . . . investment casting. MAGNORITE* fused magnesium oxide refractory cement or shapes for melting steel and processing nuclear metals. Fused zirconium oxide for handling "special" metals and alloys at even higher temperatures. CRYSTOLON* silicon carbide for aluminum reduction cells, aluminum remelt furnaces, transfer systems and many other applications. And Norton "Men with the Facts" are constantly exploring *potential* applications for newer Norton materials — other oxides, borides and carbides of the refractory metals.



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Investment Casting

solve your metallurgical problems...

NORTON Refractories and the NORTON Man

ROBERT W. LOVE played a key role in the development of refractories for high temperature melting of high purity alloys. A typical Norton "Man with the Facts," he has also pioneered in vacuum melting, aluminum reduction and remelt, investment casting and nuclear metallurgy. Always on the alert for new and challenging problems, Bob and other Norton "Men with the Facts" are ready to help *you* in the proper application of Norton Refractory Materials.

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to make your products better

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Now . . . Look to Lukens For Steel Shape Savings

Looks like a steel freight savings of $1663.47

The owl-eyed steel shape pictured above is a 3½" gage shackle plate. It weighs 483 lbs. and was flame cut to special tolerances in one of Lukens' fabricating shops. A customer ordering 50 of these from—say—600 miles away would pay a freight charge of only $493.89 on the pieces.

However, if the same customer decided to flame cut the parts himself, 106,800 lbs. of 3½" gage steel plate stock would be required. Cost of shipment . . . $2157.36. Extra cost to the customer on freight alone . . . $1663.47. *Plus* . . . the expense of his equipment investment . . . the tie-up of his capital in plate stock . . . the cost of handling 75% scrap . . . the problem of shop spoilage.

Moral: Don't pay freight on scrap. Contact Lukens for Steel Plate Shapes Service . . . flame cutting, shearing, blanking, bending, pressing, welding—of carbon and alloy plate produced on our own rolling mills. Call or write Fabrication Building, Lukens Steel Company, Coatesville, Pennsylvania.

LUKENS STEEL COMPANY
A-50 Fabrication Building
Coatesville, Pa.

Please send me your free booklet on Steel Plates Shapes.

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AGF "Automotion" Furnaces operate wholly automatically and continuously, and are easily placed in any continuous or intermittent production line.

Rotary Retort or Shaker Hearth . . . both deliver maximum efficiency and economy of any heat treating process.

Illustrated is AGF Model 240 Shaker Hearth with "in-line" Quench Tank No. 30 and AGF Conveyorized Tempering Furnace Model 242 and final quench tank . . . This AUTOMOTION production line is capable of heat treating, under completely controlled and uniform atmosphere, up to 500 lbs. of small parts per hour.

Send for details of models to meet your SPECIFIC needs.

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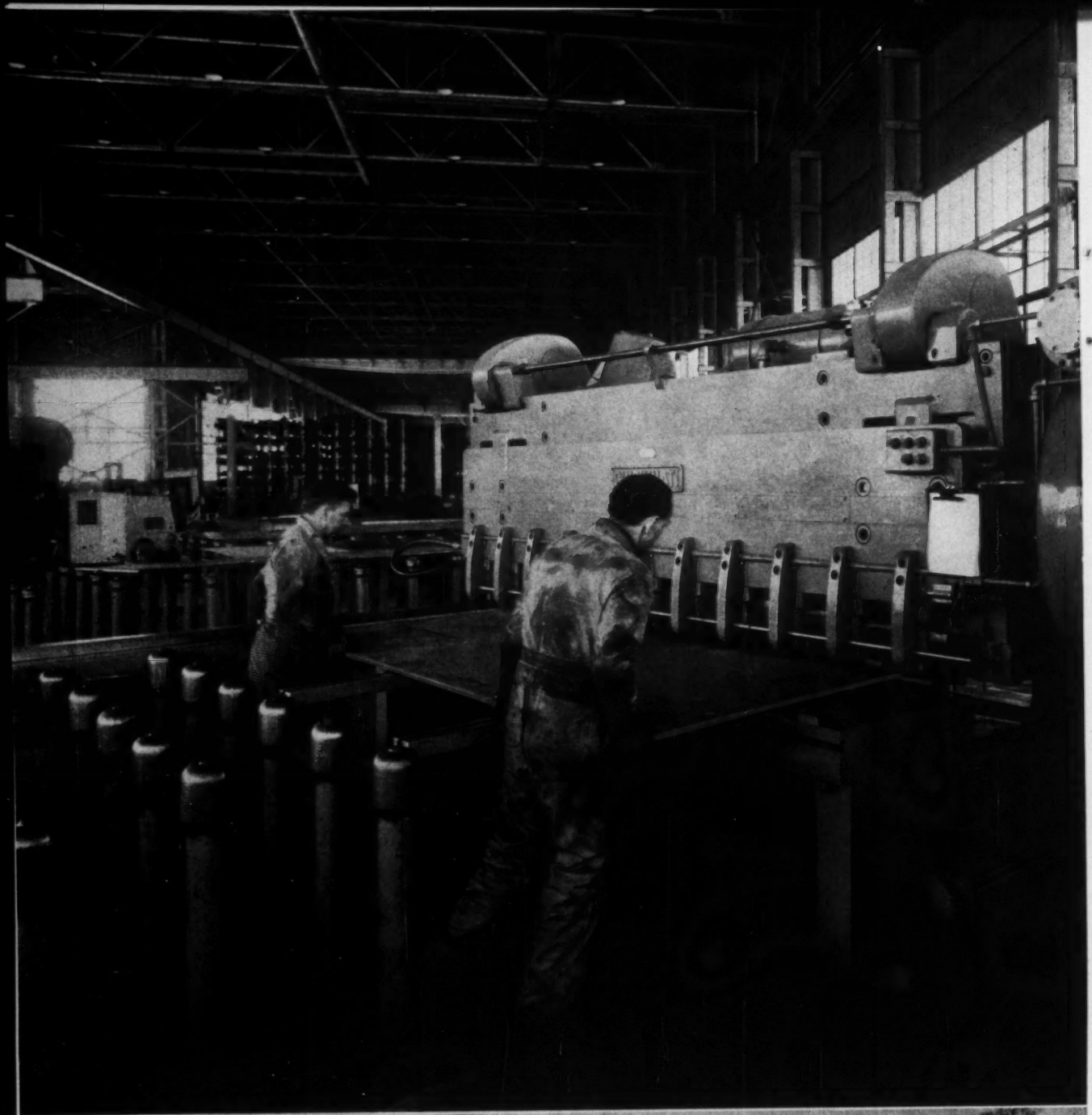

PARAGON

Ruggedness and accuracy of a Cincinnati Shear keep costs down in the fabrication of these big bridge beams. (Photos Courtesy Paragon Bridge & Steel Company, Novi, Michigan.)

THIS CINCINNATI®

shears heavy plate

Paragon Bridge & Steel Co. cuts costs as it cuts heavy plate with this Cincinnati Shear:

- Operators cut production time with rapid, easy gaging and adjustment. They don't have to change knife clearance to cut different thicknesses of material.
- The Cincinnati Shear gives them unusual versatility; enables them to do square shearing, notching, and slitting.
- They get such accuracy that they can trim an edge to one-half the thickness of a sheet! This results from such Cincinnati features as hydraulic hold-downs low rake to upper knife; inclined ram; all-steel interlocked construction.
- Extra-size, four-edge knives.

These cost-reducing features are available on all Cincinnati Shears. See Sweet's insert.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

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PRODUCTION—FABRICATION PERFORMANCE

ENGINEERING
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(Hot and Cold)
RIVETING
WELDMENTS
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...Serving REO Motors for 30 Years

MAIN RAILS, BUMPERS, CROSSMEMBERS, WELDED AND RIVETED ASSEMBLIES . . . just a few of the many items supplied by YOCAR to REO DIVISION, The White Motor Co., over the past thirty years.

Exacting standards and superior quality are well-known components of the world-famous REO TRUCK. Meeting these standards is a big part of YOCAR's service to REO and to many of our other customers.

Send us your drawings and specifications no matter what the problem. YOCAR welding and fabricating experts will apply their years of experience to see that you get the most for your investment.

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Write for new brochure "Giving You a Closer Look at the Services, Equipment and Achievements of Yocar." Dept. FD-1.

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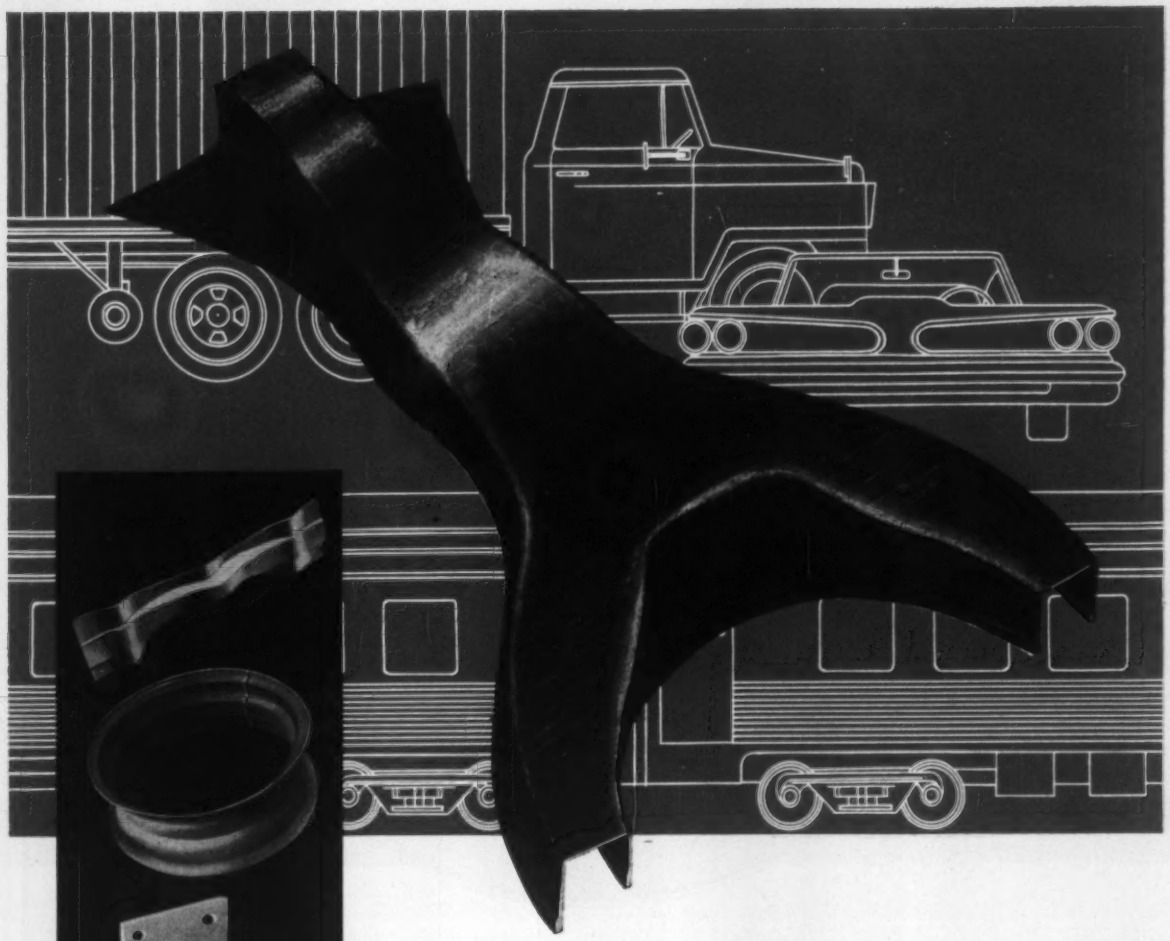
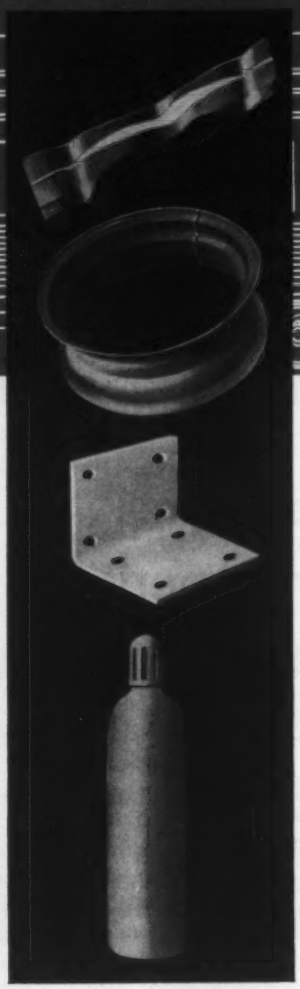




Columbium flat-rolled steels

Do you need a steel, to use in the "as rolled" condition? Or a steel which has high strength, good weldability, good formability?

More and more manufacturers are turning to columbium flat-rolled steel products, for columbium sheet, strip or plate gives an answer to all of these requirements.

Here are just a few examples of columbium steel's wide versatility. Line pipe for gas and oil offers ease of manufacture with excellent physical strength. Trucks, automobiles, farm implements, trailers and railroad cars take advantage of strength and ease of formability. Pressure vessels utilize the deep-drawing qualities of the steel. These applications and many others tell the story of columbium steel's versatility—and all with fewer rejects.

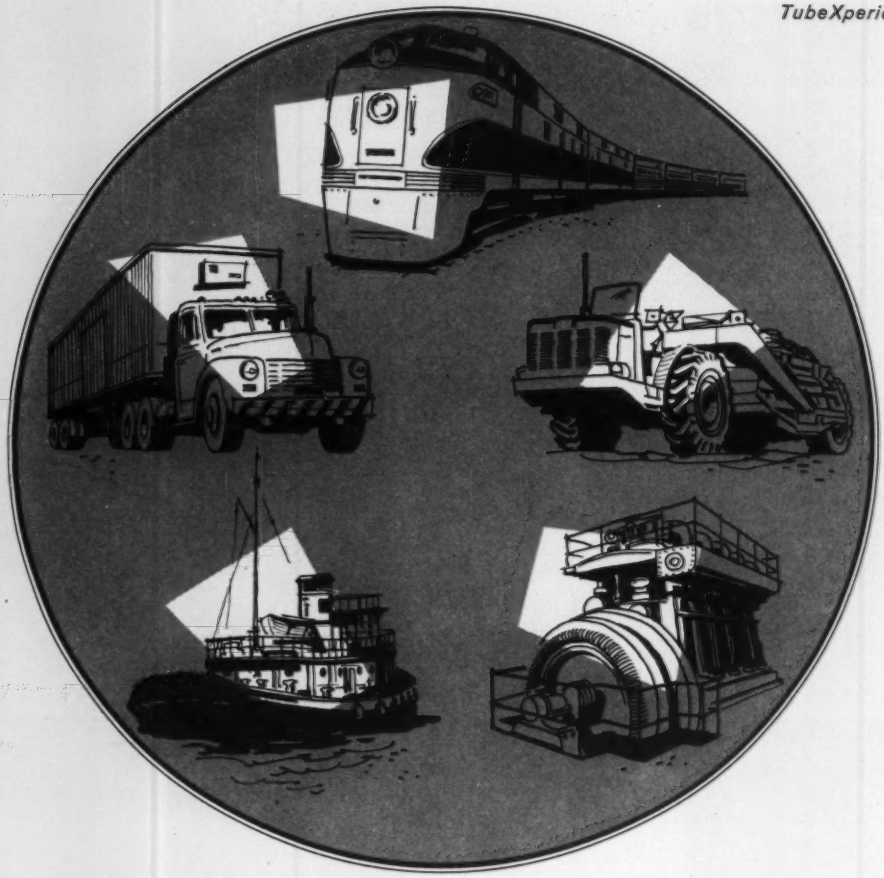
In the face of mounting manufacturing costs, columbium steels offer hope of effecting economies in producing your products. Ask any steel company for they can make it. Or ask us—we have a wide experience in its uses and knowledge of its manufacture.

MOLYBDENUM

2 Gateway Center CORPORATION OF AMERICA **Pittsburgh 22, Pa.**

Offices: Pittsburgh, Chicago, Los Angeles, New York, San Francisco
Sales Representatives: Brumley-Donaldson Co., Los Angeles, San Francisco
Subsidiary: Cleveland-Tungsten, Inc., Cleveland
Plants: Washington, Pa., York, Pa.

MCA



Feedlines for hungry horsepower . . . diesel fuel injection tubing by Superior

Fuel injection systems are the heart of thousands of diesel-powered trucks, locomotives, roadbuilding equipment, electric generators, and marine power plants. The tubing that conveys the fuel from injection pump to nozzle assembly is an important component. It must resist the stresses of pressure and vibration, yet be ductile enough to be cold swaged and upset and be cold formed into loops and bends without excessive springback. It must have a clean ID, tremendous burst strength, and high fatigue resistance. Superior diesel fuel injection tubing is just such a premium product.

Type C-1008 and Type MT-1010 carbon steel tubing are most commonly specified for this application, but alloy and stainless steel tubing for pressures above 9000 psi and greater corrosion resistance is available. Superior also makes tubing for many other applications—supplies both general and special purpose tubing for aircraft, missiles, electrical, electronic, chemical, hydraulic, dairy and nuclear, to name a few. For complete information, write Superior Tube Company, 2004 Germantown Ave., Norristown, Pa.

SOME REASONS WHY SUPERIOR FUEL INJECTION TUBING IS A PREMIUM PRODUCT

- It will handle pressures to 9000 psi, is hydrostatically tested to various pressures according to specification
- It is cold drawn, dead soft annealed, and seamless
- It is ID conditioned to remove fissures and other defects
- It is free from ID radial cracks deeper than .005 in. or 5% of wall thickness, whichever is less
- It is annealed at finish in controlled atmosphere furnaces to produce a soft, ductile and scalefree material
- Fracture tests are performed when requested

Superior Tube

The big name in small tubing

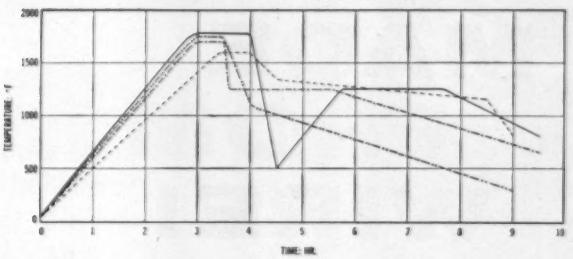
NORRISTOWN, PA.

All analyses .010 in. to ⅜ in. OD—certain analyses in light walls up to 2½ in. OD

West Coast: Pacific Tube Company, Los Angeles, California • FIRST STEEL TUBE MILL IN THE WEST

SELECT YOUR PRODUCTION
AND DIAL YOUR CYCLE . . .

with this Salem-Brosius Continuous automatic cycle annealing furnace



Salem-Brosius cycle annealing and other heat treating furnaces are engineered to conform to your most exacting product specifications. Wide range heating and cooling cycles can be varied quickly and programmed positively—with a single operator—permitting you to handle a range of heat treating jobs with a single furnace. Such furnaces are built for continuous operation or as batch types, with conventional firing or controlled atmospheres. Your requirements govern design.

Both in the United States and abroad, Salem-Brosius is recognized for its outstanding design and construction of industrial furnaces—furnaces that yield maximum high-quality output at minimum capital, operating and maintenance costs.

When you need heating or heat treating furnaces, check with Salem-Brosius for advanced design and common-sense construction.

SALEM-BROSIUS, INC.

PITTSBURGH, PENNSYLVANIA

Salem Engineering Limited, Toronto, Ontario • Salem Engineering Co., Ltd., London & Milford, England • Salem-Brosius, S.A., Luxembourg • Salem-Brosius, S.A., Paris, France • Alloy Manufacturing Corp., Pittsburgh, Pennsylvania • R. H. Freitag Manufacturing Div., Akron, Ohio • General Ionics Corp., Pittsburgh, Pennsylvania.

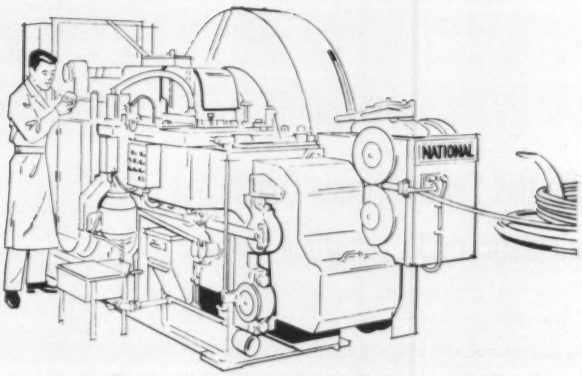
MADE FROM WIRE!

BOLTMAKERS make these interesting parts, and countless others, every day from wire.

Operations include cutting off, extruding, heading, trimming, pointing and thread-rolling.

It's just possible *your* metal parts can be made faster, stronger and at lower cost in Boltmakers (or in other types of Nationals).

May we help you investigate?



NATIONAL 1/2-INCH BOLTMAKER
4,200 PARTS PER HOUR!

Founded 1874—DESIGNERS and BUILDERS of MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS CO-PIONEERS WITH INDUSTRY OF ADVANCED METALWORKING PRODUCTION METHODS

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U. S. A.

HARTFORD DETROIT CHICAGO

MACHINERY
Gear blank forgings

FOOD PROCESSING INDUSTRY
Centrifugal Separator Cover, Stamped

CONTROLS
Valve operator housing

AUTOMOTIVE
Clutch cover, stamped

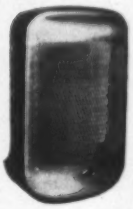
WELDING EQUIPMENT
Stamped Machine end cover

DAIRY FARMING
Milk Tank Cover, Stamped

OFFICE MACHINES
Stamped whiteprinter housing

MISSILE
Forged part

MEAT PACKING
Ham boiler, forged and stamped assembly



AGRICULTURE
Stamped tractor grill

SPORTS EQUIPMENT
Stamped Pinsetter part

ELECTRONICS
Stamped radar base

CONSTRUCTION EQUIPMENT
Forged steering spindle

ROAD BUILDING
Forged track link

37 INDUSTRIES BENEFIT FROM T & W's WIDE RANGE FACILITIES, EXPERIENCE

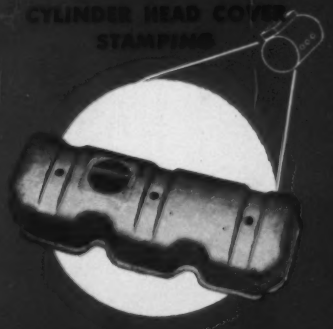
You benefit, too, from the broad range of T & W's equipment, ability, experience. Whether you need a big part or a little one, a smoothie practically ready for the plating tank or a rough tough component for a bulldozer, we can help you get it. T & W has the machines, the men, the experience, and the knowledge of how to fill your needs, that you are looking for. We sum this up as "T & W Technique," and we will be glad to explain how it serves American industry with forgings and stampings which cost less at the point of assembly.

SALES OFFICES: New York • Philadelphia • Stamford • Chicago • Detroit • Dallas • Los Angeles

SPOTLIGHTING HOW WIDE RANGE FACILITIES HELP INDUSTRY:

☆

CYLINDER HEAD COVER STAMPING



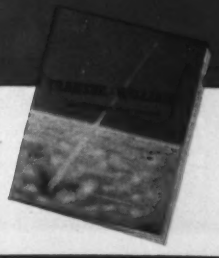
This cover, 18" long, 6⅞" wide, 4¼" deep, benefited from the wide ability of T & W in producing rugged, non-warping items of similar complex design.

DOUBLE ROLLER FORGING

A critical 117-lb. forging (with 12" max. diameter), which required expert die design to control grain flow, for strength and toughness.

WRITE FOR MORE INFORMATION

The booklet "Transue & Williams Challenges The Future" explains the wide range of facilities, and experience, which enable T & W to serve all American industry. Write for it.



FORGINGS & DEEP DRAWN STAMPINGS

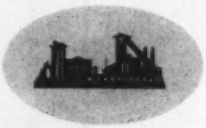
TRANSUE & WILLIAMS

ALLIANCE • OHIO, U. S. A.

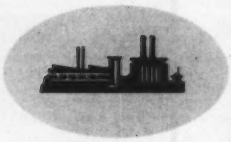
STAINLESS STEEL • MONEL • NICKEL • INCONEL • CARPENTER 20 • HASTELLOY •
TITANIUM • ALUMINUM • EVERDUR • CLAD AND ALLOY STEELS • SPECIAL METALS

Swepco SELECTED BY THE LEADERS OF INDUSTRY

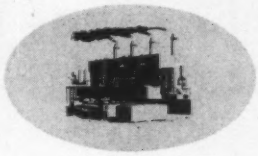
PETROLEUM



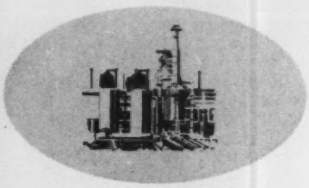
FOOD PROCESSING



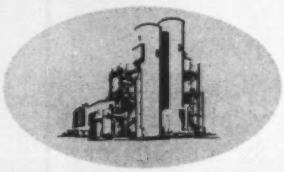
NUCLEAR



CONSTRUCTION



CHEMICAL



PAPER AND PULP

Swepco, pioneer of machine welded large diameter pipe and tubing, proudly announces the availability of a new quality line — FFR, Full Finished Rock-Forged Pipe and Tubing.

Manufactured to A.S.M.E., A.S.T.M. and Armed Forces Specifications, this new product finds applications where high temperature, corrosion, and high pressures are critical.

Ask one of the Swepco authorized distributors for complete details on Swepco's FFR, or write direct.

Swepco TUBE CORPORATION
One Clifton Boulevard • Clifton, New Jersey

The Major Manufacturer of Welded Large Diameter Pipe and Tubing
In stock at your local distributor from 2½" I.P.S. to 12" I.P.S.

STEEL SERVICE CENTER INSTITUTE

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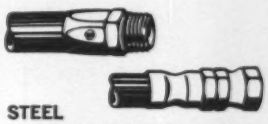
STANDARD HOSES

LOW PRESSURE	H-9 SAE 30R2	H-100 COTTON COVERED
MEDIUM PRESSURE	H-17 SAE 100R3	
HIGH PRESSURE	H-25 SAE 100R2	
MEDIUM HIGH PRESSURE	H-69 SAE 100R5	
MEDIUM HIGH PRESSURE	H-108 SAE 100R1	
HIGH PRESSURE	H-35	H-50

Spiral Wire Reinforced

REUSABLE ENDS



STEEL

STANDARD 2-PC. END

For fast assembly and positive, leakproof connections. Designed for dependable performance under high pressure. Skive and no-skive.

CLAMP-TYPE

For most two-wire braid high-pressure hydraulic hose applications. No skiving of hose or special tools required.

BARB-TITE ENDS

Fast, easy push-on, stay-on hose ends for all types of low pressure applications. Sizes ¼" to ¾" I.D. Rugged and durable.

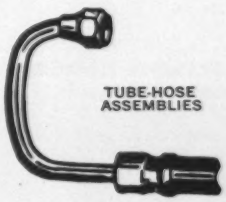
HOSE ASSEMBLIES

PERMANENTLY ATTACHED HOSE ENDS

Swaged or crimped permanently attached hose ends. Any quantity, any size, any type. ⅛" to 2". For all working pressures.

CRIMPED

SWAGED

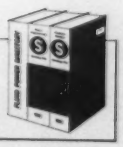


TUBE-HOSE ASSEMBLIES

THE WEATHERHEAD COMPANY

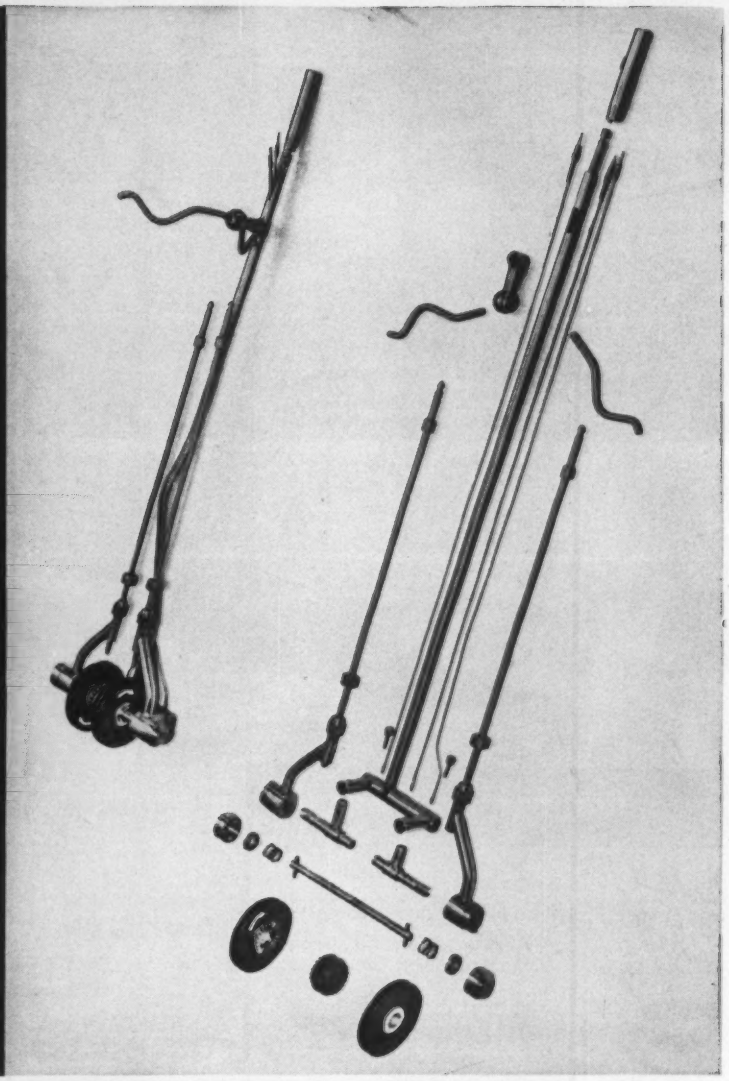
FORT WAYNE DIVISION • Dept. IA-5, 128 West Washington Blvd.
Fort Wayne, Indiana

FOR DETAILS
See Weatherhead catalog in Sweet's Product Design File, Plant Engineering File, the Fluid Power Directory, or write direct.



HERE'S HOW STILL ANOTHER MANUFACTURER JOINS STAINLESS STEEL TUBING:

He uses Handy & Harman's BRAZE 630



He's one of many manufacturers and fabricators who have found—to their lasting satisfaction—that Handy & Harman silver alloy brazing is the final answer to stainless steel joining problems.

Super-Donic Manufacturing Company, Atlanta, Georgia, manufactures "Dual Arm Transmissions" for the dental industry. Most everybody has—at one time or another—seen and/or felt this unit in operation.

It is fabricated of small diameter 304 and 316 stainless steel tubing and, in its assembled form, consists of some 17 separate brazed joints. Joints must be strong, corrosion resistant and neat-appearing.

Each of the 17 joints is hand-torch brazed with Handy & Harman BRAZE 630 wire and HANDY FLUX TYPE B-1. There's no question that this is a unique application. There's no question, either, that the application is stainless steel. The ease and economy with which this manufacturer solves his problems can be just as readily applied to *your* stainless steel joining problems.

Strength, production speed, electrical and thermal conductivity, gas and liquid tightness and low cost are *natural* benefits of silver alloy brazing. We think it worth your while to learn more about this remarkable metal-joining method—we'll be glad to send you any information you ask for. Handy & Harman, 82 Fulton St., New York 38, N. Y.

FOR A GOOD START: BULLETIN 20

This informative booklet gives a good picture of silver brazing and its benefits... includes details on alloys, heating methods, joint design and production techniques. Write for your copy.

Your No. 1 Source of Supply and Authority on Brazing Alloys

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.

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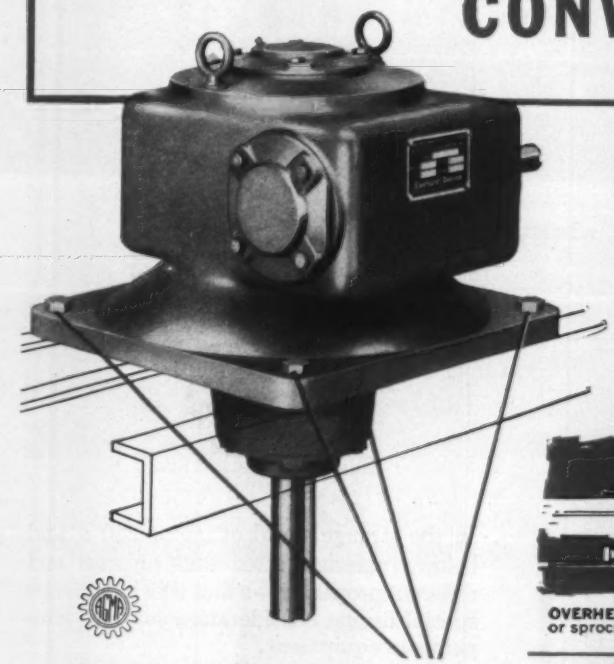
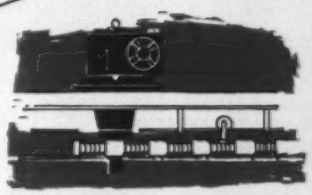
FAST off-the-shelf delivery

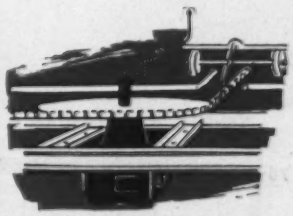
MORSE EBERHARDT-DENVER CONVEYOR DRIVES



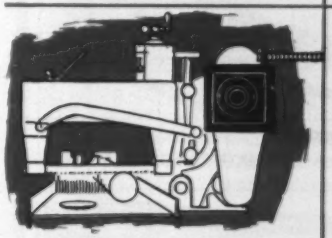
★ No design limitation . . . up, down, or 90° mounting ★ one-piece alloy cast iron housing ★ high torque capacity ★ single or double reduction gears ★ input ratings from .12 hp to 53.72 hp using double worm reduction or helical worm reduction ★ ratios from 5:1 up to 3600:1—from stock at low factory prices.



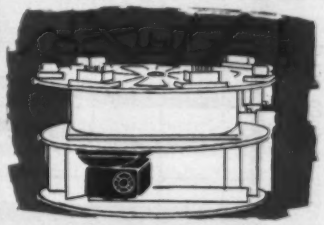
OVERHEAD . . . typical caterpillar or sprocket drives



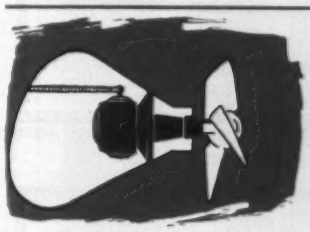
SUB-FLOOR . . . for towline or special equipment



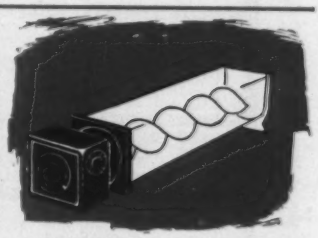
90° MOUNTING . . . for heavy-duty metal saws and machines



VERTICAL . . . base mounting for power turntable machines



SIDE MOUNTED . . . paint, pulp, liquid, or chemical agitators



HORIZONTAL . . . screw conveyors, straight or angular mounts . . . and scores of standard or special uses.

Easy-mount design . . . only 4 bolts

Morse E-D speed reducers lead in limitless applications with utmost ease in mounting. The 4 holes form a perfect square concentric to the output shaft. Unlike most designs, Morse E-D speed reducers feature oversize bearings on wide centers . . . resulting in an overhung load capacity at the end of the output shaft equal to the torque capacity.

Mounting versatility with the unit's cast-in base makes Morse drives adaptable to conveyors of all types, agitators, screw conveyors, machines, and for any other transmission of power where dependable speed reduction is specified.

You'll find Morse "standard" drives ready for immediate delivery . . . often eliminate the problems of "specials." Check with your Morse distributor, he's listed in the Yellow Pages under "Power Transmission," or write Morse Chain Company, Dept. 33-50, Ithaca, N. Y. for illustrated catalogs. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ontario.

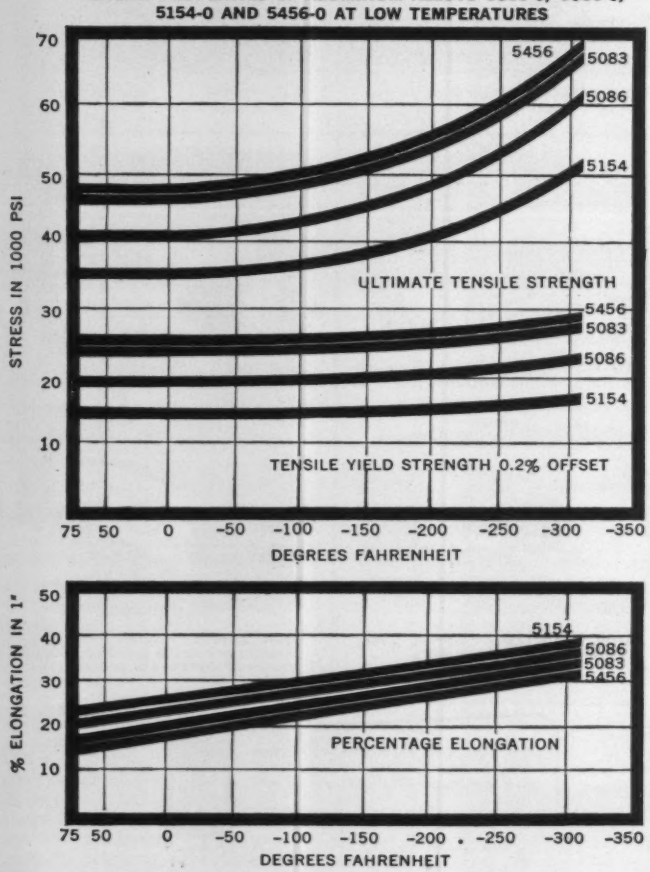
MORSE BW

A BORG-WARNER INDUSTRY

Why Aluminum for Low Temperature Equipment?

- **when temperatures go down, aluminum's strength goes up**
- **aluminum is light in weight**
- **aluminum is easy to fabricate**

TENSILE PROPERTIES OF ALUMINUM ALLOYS 5083-0, 5086-0, 5154-0 AND 5456-0 AT LOW TEMPERATURES



In the strange world of minus 250°F and below, materials often take on new and different properties—a fact which demands special design consideration for low temperature equipment.

And more and more frequently, designers are finding that aluminum, better than any other material, meets the mechanical, thermal and economic requirements for these "cryogenic" jobs.

For example, low carbon steels lose so much strength at low temperatures that they can't usually be considered. Nickel-alloy steels have better strength than low carbon steel, but in many cases are more expensive to fabricate than aluminum. Aluminum is one of the lowest-cost metals that retains or improves its strength at low temperatures.

LOW TEMPERATURE STRENGTH

Aluminum's properties change at sub-sub-zero temperatures, just as all metals do, but the change is for the better. The yield strength, tensile strength and percentage elongation of aluminum all *improve* as temperatures approach absolute zero. This is not true of all metals: Ferritic steels become brittle at low temperatures; the mechanical properties of stainless steel are improved, but it is costly when compared to aluminum.

INCREASING ALUMINUM USES

Largely because of its excellent low-temperature properties and its low cost, Reynolds Aluminum is used in containers, handling and processing equipment for liquefied gases.

Strong lightweight aluminum sheet, plate, pipe, tubing and extrusions are used to handle and process liquefied natural gases, oxygen, nitrogen, hydrogen, helium, and rare gases. Temperatures required to keep these in a liquid state range as low as −452°F, only 8° above absolute zero! Aluminum is the most economical material that can stand up under these extreme conditions.

In addition to its low temperature strength and ductility, aluminum offers other advantages in containers and handling equipment. It is light in weight—*one-third* the weight of steel—a big benefit in shipping containers and portable equipment.

FABRICATION SAVINGS

Aluminum is easy to handle, easy to join and form. It welds and cuts quickly, often reducing fabricating costs. And it is non-magnetic, non-toxic, and non-sparking, safer to use with volatiles. Finally, *aluminum is one of the lowest-cost corrosion resistant materials available.*

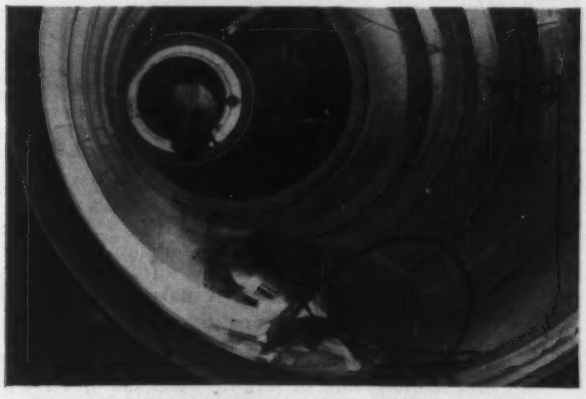
When you design any equipment for low temperature use, be sure to consider the economics and the low temperature strength of aluminum. For full information on aluminum for low-temperature duty, contact your local Reynolds office, or write *Reynolds Metals Company, P.O. Box 2346-JK, Richmond 18, Virginia.*

REYNOLDS ALUMINUM

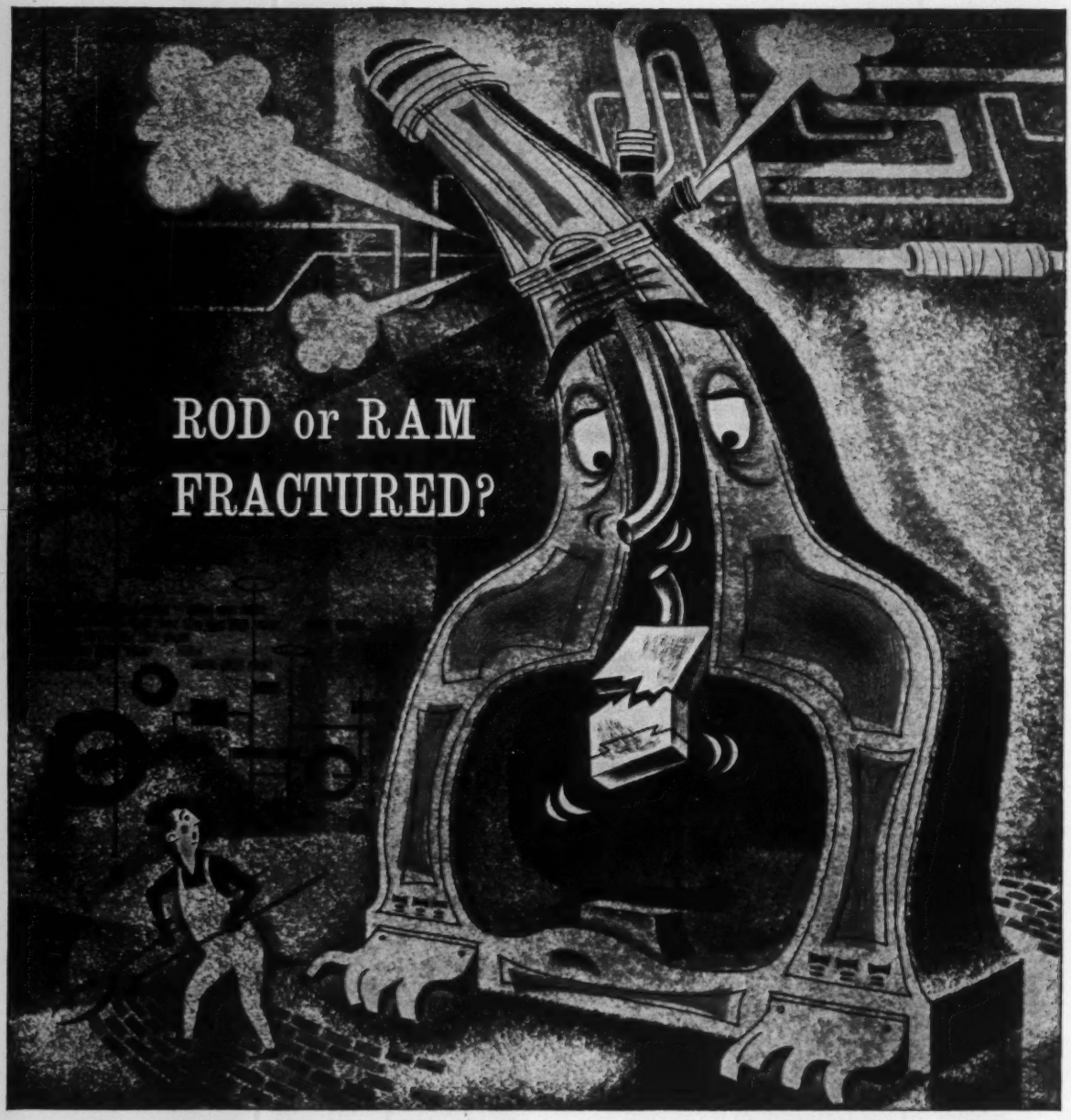
Watch Reynolds TV shows: "BOURBON STREET BEAT" "ADVENTURES IN PARADISE"; and "ALL STAR GOLF" (resuming in October)—ABC-TV

Liquid oxygen for missile fuel is flown to launching sites in this "vacuum bottle," lined with strong, lightweight aluminum. Aluminum's light weight, as well as its high strength at low temperatures, makes it ideal container material for this job.

Ship designed to carry liquefied methane (at −260°F) to England. Liquid is kept in 6,000-barrel tanks made with Reynolds Aluminum plate, the one economical material with improved strength at low temperatures. Aluminum is also used in piping and processing equipment.



Aluminum welds quickly and easily by all common welding methods—as in this liquid gas tank fabrication. It also cuts and forms easily, often effecting savings in construction. And it is one of the most economical corrosion-resistant materials.



Call ERIE FOUNDRY for forging hammer replacement parts to your specifications

Replacement rods and rams, and many other parts for a wide variety of forging hammers of most any make are available from Erie Foundry. They are high in quality, competitive in price.

For over 65 years Erie Foundry has specialized in the design, development and manufacture of forging hammers of all types. Logically, then, Erie Foundry is a sure source for repair parts equal in quality and performance to the original equipment. Substantial inventories assure you of prompt service.

For more information on repair parts or our complete Rebuilding Service, write Mr. James Walker.

ERIE

ONE OF THE GREAT NAMES IN FORGING SINCE 1895

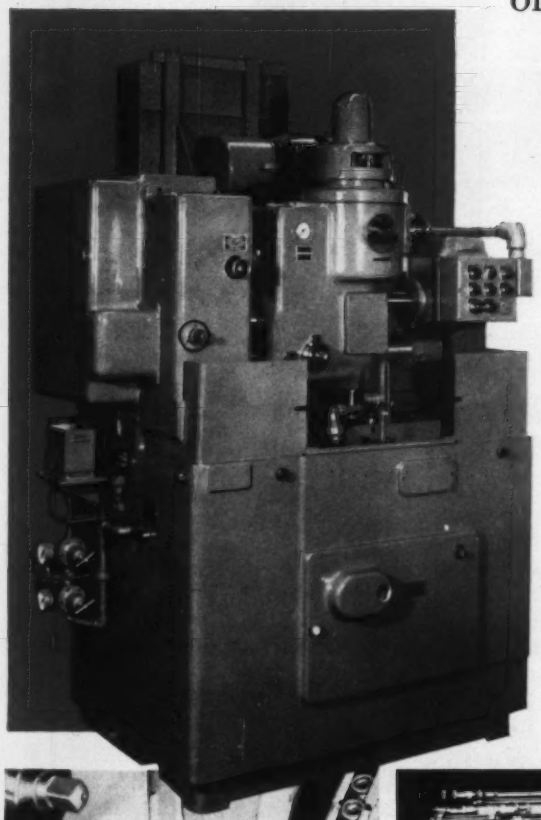
ERIE FOUNDRY CO., Erie, Pa.

Manufacturers of Forging Hammers • Forging Presses • Hydraulic Presses • Trimming Presses

EF-60-01

AUTOMATIC WORK HANDLING

Is A Natural Complement to the High Production Rates of the Fellows 4GS Gear Shaper

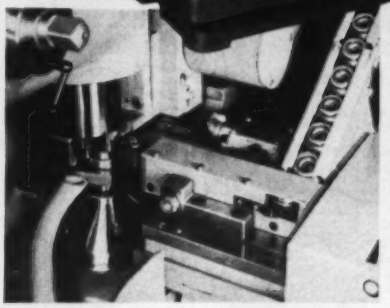


Although designed for both manual and automatic loading, the 4GS Fellows Gear Shaper makes best use of its high production rates when equipped with work handling devices.

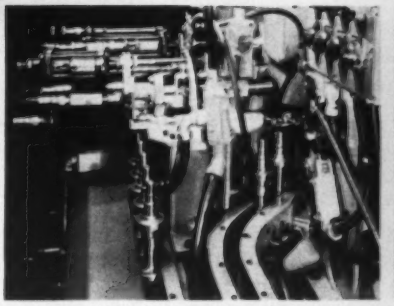
The physical construction of the machine is such that it may be easily adapted for use with magazines and chutes for automatic loading and unloading at substantial cost savings on continuous production runs.

Ask your Fellows representative about the many advantages of automatic work handling with the 4GS Fellows Gear Shaper, or write direct to the Fellows Gear Shaper Company.

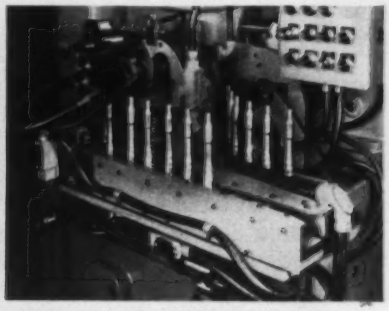
THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont, U. S. A.
Branch Offices:
1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45



These internal clutch parts are fed automatically from a vibratory feeder down a chute to the magazine slide from which they are located and clamped. The cutter spindle is automatically stopped at the top of its stroke for clearance during the loading and unloading cycle. Cutting time is 1½ minutes. *Gear Data:* 10 Teeth, 12.4 Pitch (Stubbed), 30° Pressure Angle, Spur, 5/32" Face Width.

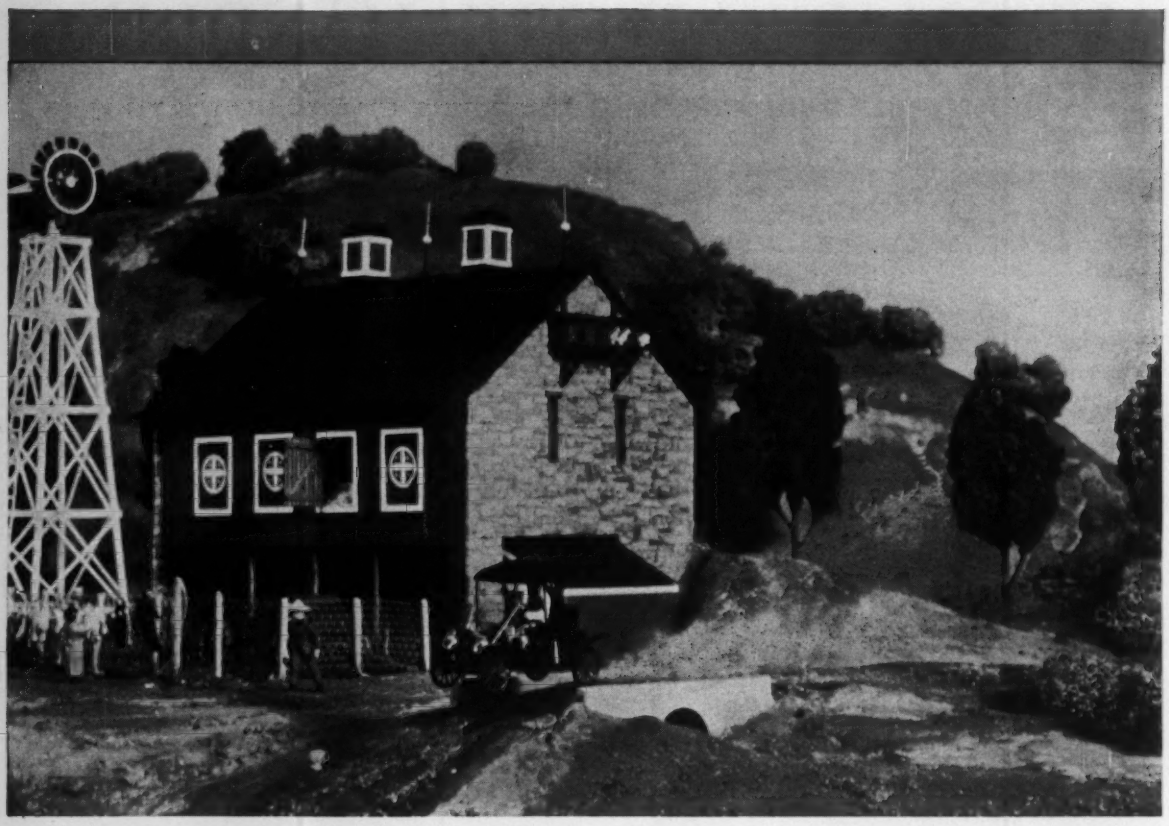


This transmission cluster gear shaft is handled by two sets of air-operated "fingers" mounted on a turret. As the turret rotates, one set of fingers moves the finished piece to the unloading chute while the other set brings the new blank into position. Cutting time is 35 seconds. *Gear Data:* 10 Teeth, 12.4 Pitch (Stubbed), 30° Pressure Angle, External Spur, 5/32" Face Width.



This automotive stem pinion is handled in the same manner as the cluster gear. In both cases, safety devices prevent the machine from starting unless the blanks are in the correct cutting position. Loading and unloading chutes may be hand or conveyor fed. Cutting time is 2½ minutes. *Gear Data:* 17 Teeth, 10 Pitch, 19° 30′ Pressure Angle, 32° 51′ Helix Angle, ⅝" Face Width.

THE PRECISION LINE *Fellows* *Gear Production Equipment*

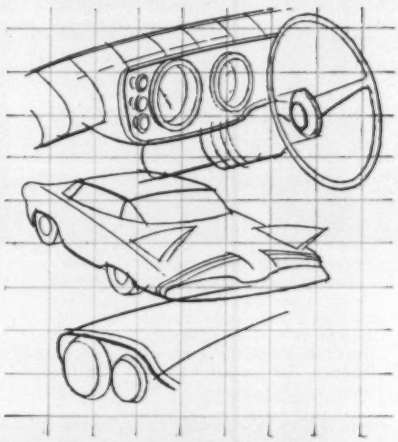


Custom Made OSTUCO Tubing..... gets your product off the ground

OSTUCO tubing is the exact tubing you need for your product because OSTUCO Tubing is CUSTOM MADE for your product. Your order is manufactured to your own specifications to produce steel tubing especially for your application—the precise grade, analysis, size, shape, special anneal and tolerances best suited to your own needs.

Ohio Seamless Tube produces both seamless and electric welded steel tubing—is prepared to form many finished or semi-finished tubular parts to your designs.

To get the most from your next steel tubing order, use Custom Made OSTUCO TUBING. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.



A-2168A

Model illustrated built to 3.5 mm scale.

SEE US AT BOOTH 629—DESIGN ENGINEERING SHOW MAY 23-26

OSTUCO SHELBY, OHIO

OHIO SEAMLESS TUBE

Division of Copperweld Steel Company • SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

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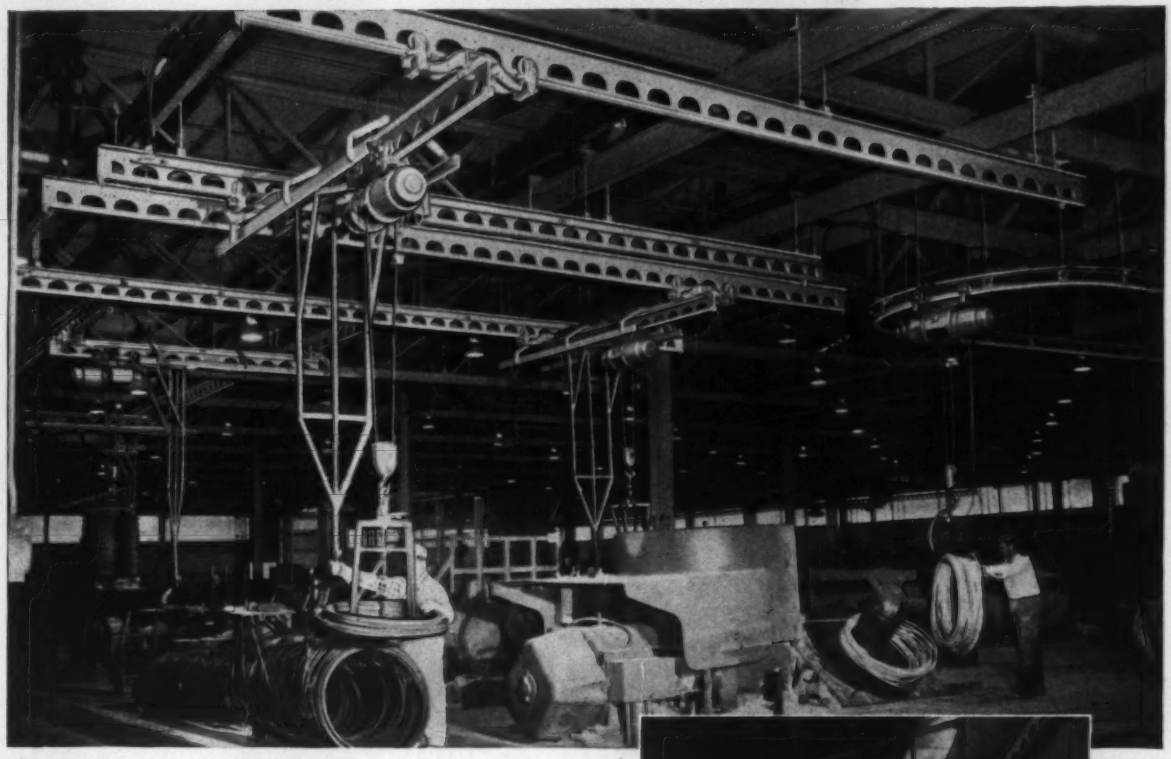
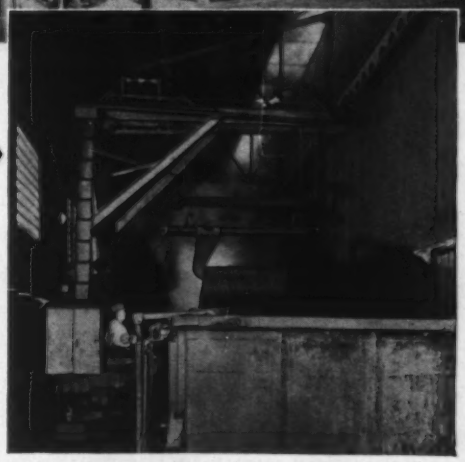
CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York

RUGGEDLY BUILT HANDLING EQUIPMENT
FOR WIRE AND ROD MILL SERVICE
Cleveland Tramrail Equipment FULLY PROVEN On Hundreds of HARD-DUTY Applications



Cleveland Tramrail is easy to install and use. Much of the equipment has been especially designed for wire and rod handling service.



Cleaning house gantry crane. This is one of many Cleveland Tramrail developments that have brought important advantages to the wire and rod industry.

PRODUCERS and fabricators of wire and rod throughout the United States and Canada have long depended upon Cleveland Tramrail overhead materials handling equipment for a wide variety of handling operations.

Cleveland Tramrail is a leader in the development of equipment to especially suit the needs of this industry. For instance: (1) Carriers with special extended propelling arms for block-stripping service as illustrated above; (2) Hairpin-Hook grab for coil handling; (3) Vertical-storage grab for fast selective coil storage; (4) Crane with rotating and tilting hook for horizontal coil storage; (5) Several types of gantry cranes for low-cost efficient cleaning of wire and rod.

For real help on wire and rod handling problems based upon extensive long-time experience with the foremost names of the industry, call your local Cleveland Tramrail sales engineer.

Write for free booklet No. 2008

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4826 E. 288 ST. • WICKLIFFE, OHIO

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ALWAYS RARIN' TO GO!

Yours from the case of the A. O. Smith Motor Man

...the complete story of these 800 to 1 hp favorites and their winning ways in the toughest going

Long-life service, low maintenance and quiet operation are qualities that have been bred into the A. O. Smith line. That's why they're the *go* motors — the integrals you can depend upon when the going gets tough. You can hitch your application to single-phase models (1-5 hp) or polyphase (1-800 hp). Also a full line of fractional-hp motors.

And it's always post time for your nearby A. O. Smith Motor Man — off and running to provide 24-48-hour action on all parts and service orders.

Through research ... a better way

A.O.Smith
CORPORATION

ELECTRIC MOTORS
Tipp City, Ohio

A. O. SMITH INTERNATIONAL S. A.
Milwaukee 1, Wisconsin, U. S. A.

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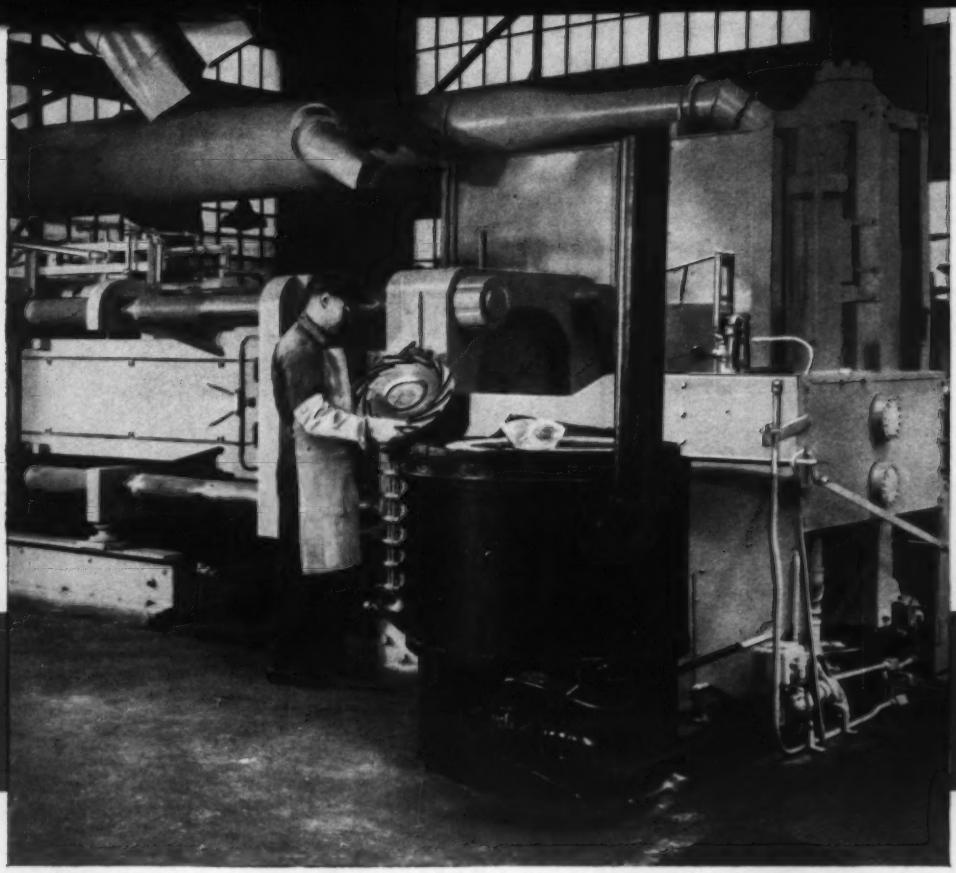

A 750-ton cold chamber die-casting machine at Alcoa's Garwood plant. Holding furnace in foreground containing molten metal is close to pressurized hydraulic lines.

Cellulubes promote safety at Alcoa

where hydraulic lines at 3500 psi pass near molten metal

The danger of fire due to line breaks has been held to a minimum at Alcoa's Garwood Works. In die-casting operations, Aluminum Company of America uses Cellulube fire-resistant hydraulic fluids in the hydraulic system serving the die-casting machines.

Although there have occasionally been line breaks under pressures ranging up to 2,000-3,500 psi, no serious fires have ever resulted. Alcoa has found that Cellulubes not only perform well as hydraulic fluids, but provide excellent lubrication of pump parts.

Cellulubes, the *safe* hydraulic fluids, are available in six controlled viscosities: 90, 150, 220, 300, 550 and 1000 SUS at 100°F. You can select the viscosity best suited to your operations. Cellulubes may well make an important contribution to the safety of your plant and personnel. Write to us for more information about Cellulubes. If you'd like a sample for evaluation, please let us know what application you have in mind.

Celanese® Cellulube®

Celanese CHEMICALS

CELANESE CHEMICAL COMPANY
a Division of Celanese Corporation of America
Dept. 578-E, 180 Madison Ave., New York 16, N.Y.

Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16.

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WORM GEAR SETS

Check these advantages:

- Involute helicoid thread form (strongest thread form made)
- Centrifugally cast gears
- More horsepower per dollar

Delroyd units are manufactured in a modern plant devoted specifically to the production of worm gearing—a plant which has one of the largest thread milling and thread grinding capacities in the United States. Because we use this exclusive precision machinery, the most exacting testing techniques and highly skilled workmanship, you are assured of quality and service associated with the leading specialists in worm gearing.

Delroyd provides the widest range of sizes and ratios, and offers complete interchangeability of parts. Whether you specify worm gear sets or worm gear speed reducers, you are assured of the finest quality obtainable.

DE LAVAL *Steam Turbine Company*

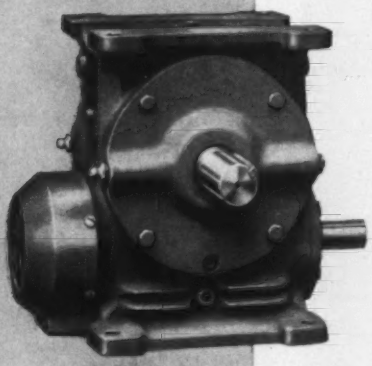
899 NOTTINGHAM WAY, TRENTON 2, N. J.

DELROYD

WORM GEAR SPEED REDUCERS

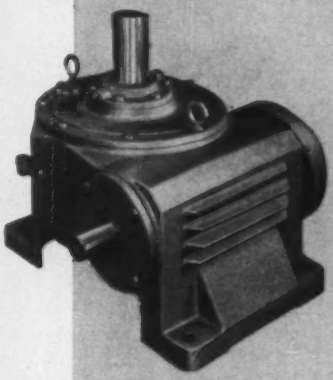
FAN COOLED RIBBED CASES

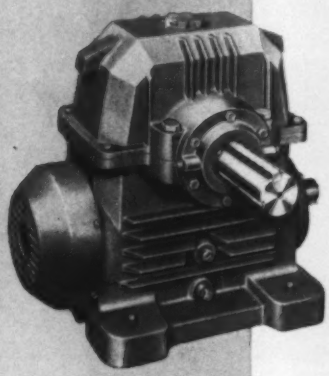
Widest range of ratings available—from .05 HP, 1⅛" center distance to 1050 HP, 36" center distance—in single and double reduction units



TYPE D
Verso Unit
Adapts to any mounting requirement
Ratios:
5:1 to 70:1
Horsepowers:
.062 to 13.5
Center distance:
2½" to 4"

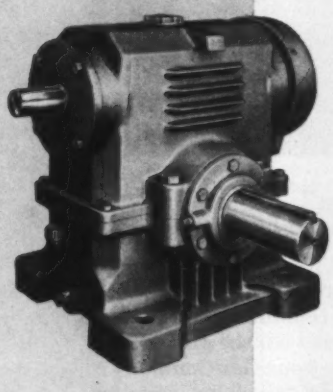
TYPE V
Vertical single reduction
Shaft up or down
Ratios:
5:1 to 70:1
Horsepowers:
.062 to 150
Center distance:
5" to 12"





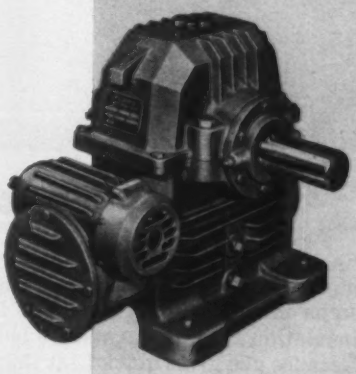
TYPE B
Horizontal single reduction
Bottom drive
Ratios:
5:1 to 70:1
Horsepowers:
.062 to 150
Center distance:
5" to 12"

TYPE HB
Horizontal helical-worm
Right angle drive
Ratios:
15:1 to 355:1
Output torque:
2460 in. lbs. to 135000 in. lbs.
Center distance:
3½" to 12"



TYPE T
Horizontal single reduction
Top drive
Ratios:
5:1 to 70:1
Horsepowers:
.062 to 150
Center distance:
5" to 12"

TYPE DB
Horizontal double-worm
Parallel input and output shafts
Ratios:
75:1 to 4900:1
Output torque:
4170 in. lbs. to 135000 in. lbs.
Center distance:
3½" to 12"



Prompt delivery from stock—all units through 12 inch center distance

DE LAVAL *Steam Turbine Company*

899 NOTTINGHAM WAY, TRENTON 2, N. J.

"Only GAS gives quick, controlled, complete combustion"

Albert Holzwasser, President, Arrow Armatures, Boston

"Arrow Armatures is the largest rebuilder of automobile generators in the East. One of the important steps in rebuilding generators is burning the old insulation from the armature before it is rewound. Because gas gives quick heat that can be accurately controlled, it answers our need perfectly.

"We also have a gas-fired catalytic combustion unit to incinerate the smoke and fumes produced in burning off this insulation. Together these units give us complete, clean combustion with no smoke control problems," states Albert Holzwasser, President.

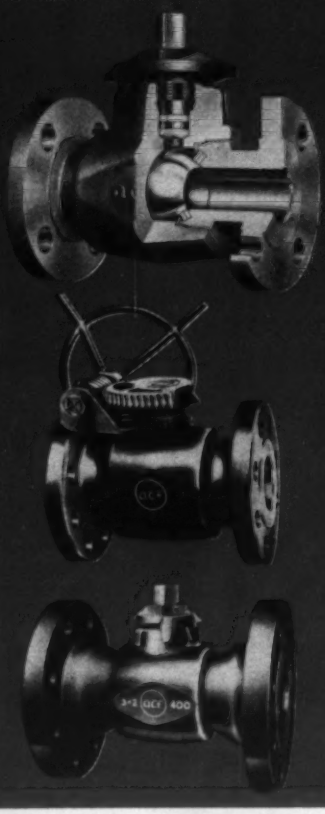
Quick, controlled, complete combustion—and the many other advantages of gas—can be yours, too. For technical information, see your Gas Company's Industrial Sales Engineer. He can show you the economies and results you'll get with modern industrial gas equipment. *American Gas Association.*

FOR PRECISE CONTROL, GAS IS GOOD BUSINESS!

"Install 'em anywhere – no maintenance needed"

PRODUCT OF W-K-M's

Creative Engineering



ACF non-lubricated Ball Valves feature Teflon stem gaskets and seats. There's no lubricant to cause sticking or contamination.

Working Pressures: In carbon steel with ASA ratings of 150 pound and 300 pound, and some sizes in ASA 600 pound; in semi-steel with 200 and 400 pound WOG ratings.

Sizes: ½" through 6". Regular port valves up to 8" x 6".

5922

ACF non-lubricated Ball Valves

ACF Ball Valves are not only non-lubricated . . . but designed *throughout* for maintenance-free performance. For example: The ball is suspended between Teflon* seats under compression for leakproof sealing. Seats are protected from the lading flow. And the full bore conduit provides *smooth* flow, with no destructive turbulence . . . no more pressure drop than through an equal length of pipe.

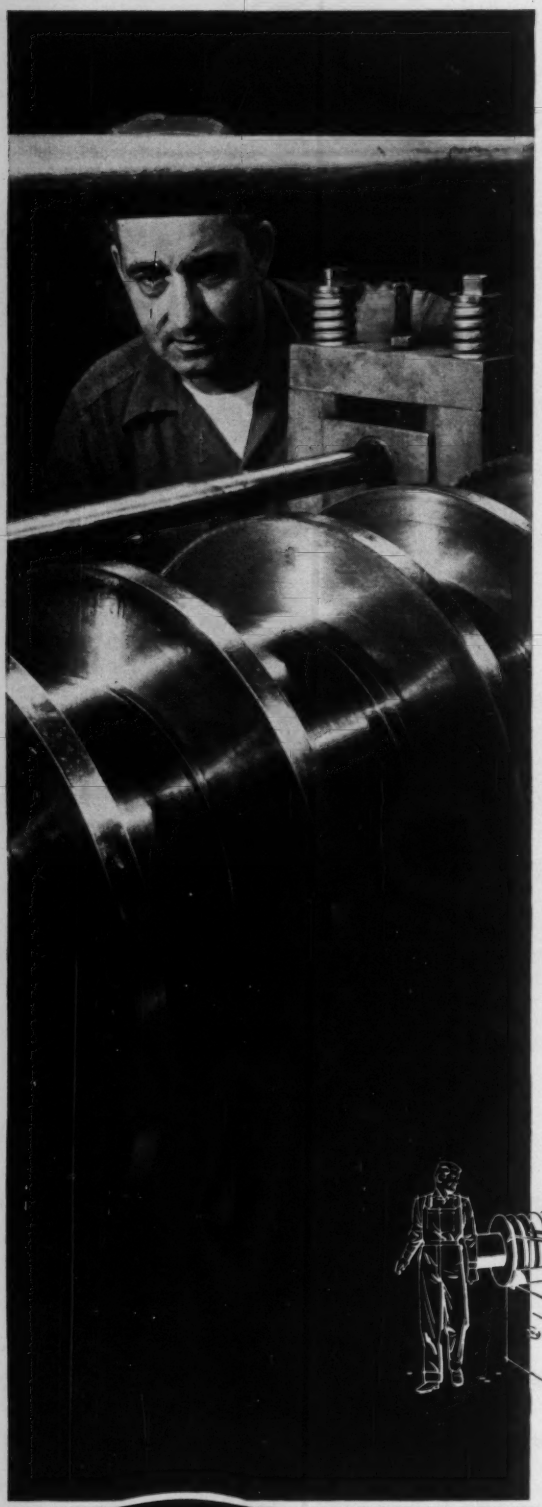
A quick quarter-turn operates this rugged valve. Specify it. You'll get efficient, economical performance. *Available from leading suppliers everywhere.*

* Du Pont Trademark

WRITE FOR CATALOG 1000

W-K-M

DIVISION OF ACF INDUSTRIES
INCORPORATED
P. O. BOX 2117, HOUSTON, TEXAS



Yoder Rotary Slitters reduce inventory... speed production

To help meet the demands of tight production schedules, YODER Slitters reduce mill-width stock quickly and economically to desired widths. If your needs are as low as 100 tons per month, time and manpower savings alone will offset the cost of your YODER Slitter in a matter of months, while reducing basic inventories. Compactly designed, standard YODER Slitters are built to handle standard coil widths...completely engineered lines for special requirements.

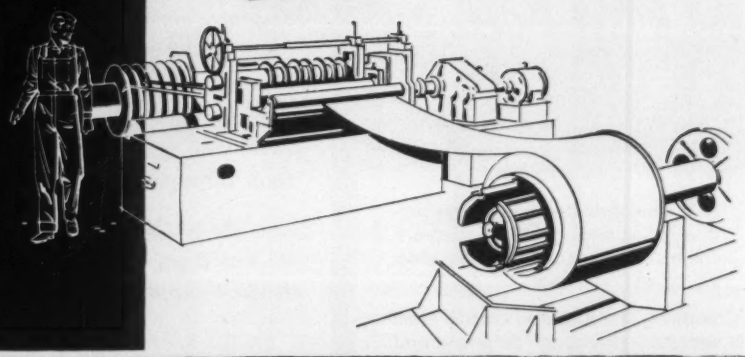
YODER accessories, such as coil cars, swivel unloaders, scrap choppers, scrap disposers, plate levelers and coil boxes, make stock handling fast and easy.

YODER also makes a complete line of Cold Roll-Forming equipment and Pipe and Tube Mills. To profit from YODER'S years of engineering and service experience, contact your local YODER representative or send for the YODER Slitter Manual.

THE YODER COMPANY

5510 Walworth Avenue • • Cleveland 1, Ohio

Investigate the many advantages of YODER-engineered Slitter Installations. Write today for this comprehensive, 80 page YODER Slitter Manual ...it's yours for the asking!



ENGINEERING **YODER** MANUFACTURING

ROTARY SLITTING LINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)

COLD ROLL FORMING MACHINES

Meet "VIZI"... the disc that lets you SEE your work ...WHILE you work!

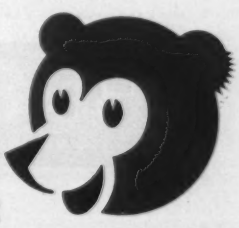
The VIZI-DISC

Here is the VIZI-DISC mounted on a portable grinder ready to run. Note the unique shape.

As the grinder starts we get a spinning pattern similar to a propeller or electric fan blade.

Operator can "look through" the VIZI-DISC as grinder turns-over at full rpm.

This is what everyone is talking about. The new METALITE VIZI-DISC lets you see the exact area where the work is being done. Its unique shape gives it "see through" like a blade of an electric fan or an airplane propeller. This amazing new disc actually cools itself while it's cutting. And, because there is no blind spot, you grind only the area that needs to be smoothed, thus increasing disc life. VIZI-PADS to back-up the VIZI-DISC are available. They have a herringbone non-skid face that grips the abrasive disc, and guarantees an aggressive rate-of-cut. You can get a free demonstration from a Behr-Manning representative or write Dept. IA-5.



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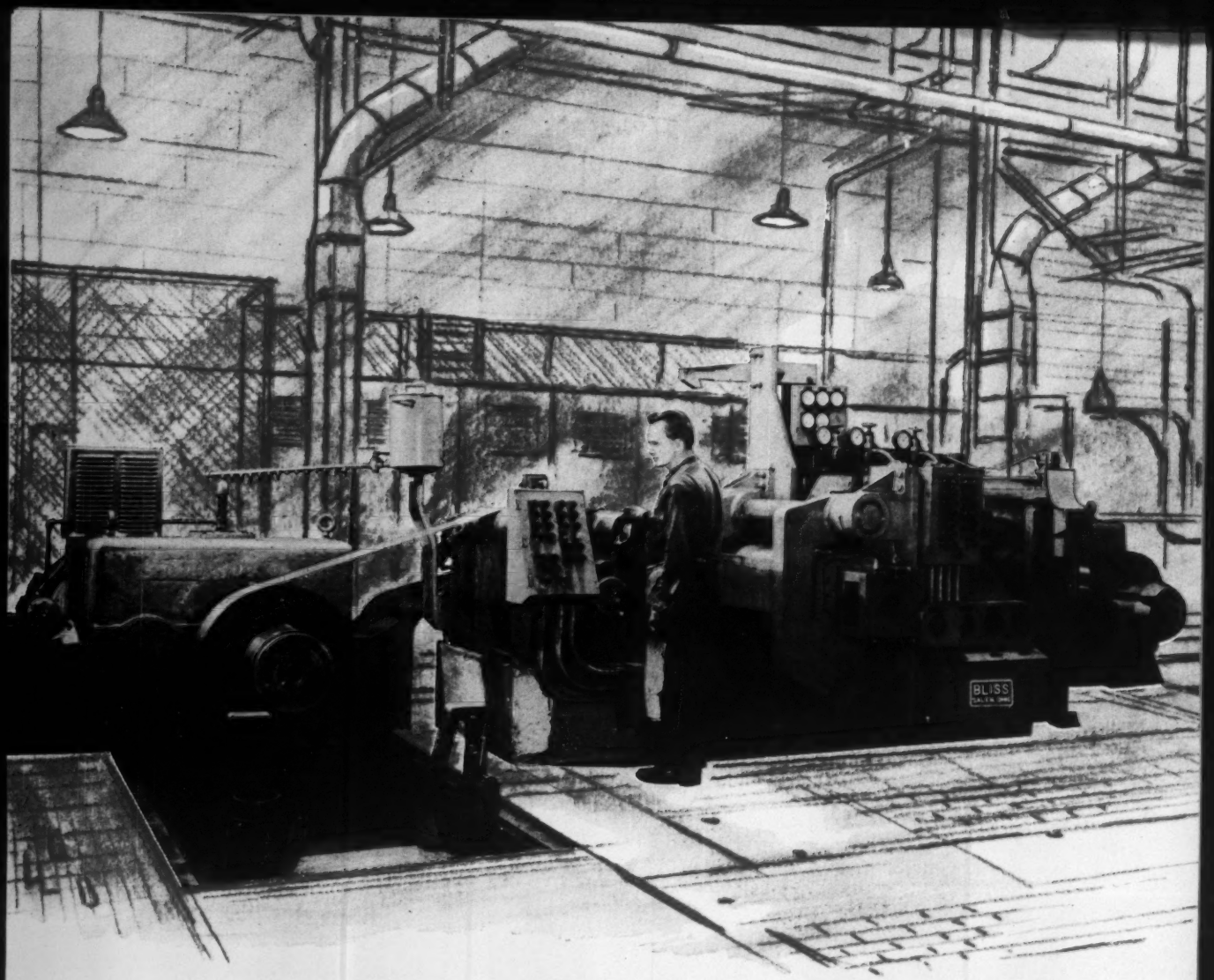
TROY, NEW YORK
A DIVISION OF NORTON COMPANY NORTON

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes • Floor Maintenance Products
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals
In Canada: Behr-Manning (Canada) Ltd., Brantford. • For Export: Norton International Inc., Troy, New York, U. S. A.



How Bliss helps ease the tension at Acme Steel

This new rewind line, designed and built by Bliss' Rolling Mill Division, helps Acme Steel's Riverdale, Ill., plant achieve a higher quality cold rolled strip.

All strip in widths from 2" to 26" and gages of .050" and thinner is run through the line before annealing. Between the line's mandrel-type payoff reel and the tension reel are a pinch roll and an electrically-controlled bridle which the operator sets for various strip widths and gages.

The tension applied between the bridle and the tension reel "relaxes" the strip so that it won't stick when it goes through the annealing furnace. Maximum speed through the rewind line is 1000 feet per minute and it is in operation almost continuously.

It's another illustration of how Bliss engineering can solve a metal rolling plant's problems. For other examples of Bliss Rolling Mill installations, write today for your copy of the 84-page Bliss Rolling Mill Brochure, Bulletin 40-B.

BLISS
SINCE 1857

Bliss is more than a name... it's a guarantee

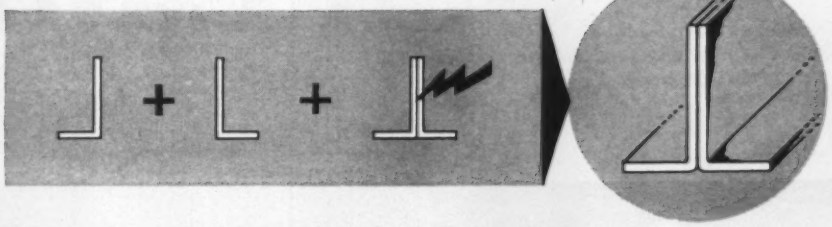
E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio

Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio

How to save money and time with

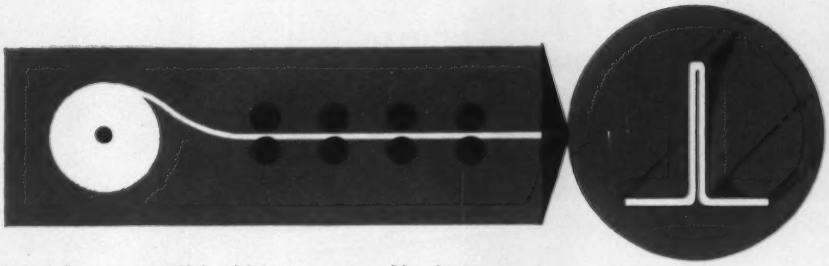
VAN HUFFEL ROLLER DIE COLD FORMED METAL SHAPES

THE SLOW COSTLY WAY



Expensive time and labor are obviously involved in this tee section formed by welding two angles together. Hundreds of more complicated sections can and are being roller die, cold formed by Van Huffel effecting tremendous savings in production costs.

THE FAST LOW-COST VAN HUFFEL WAY



Here's how Van Huffel cold forms sections like this economically, in continuous lengths from roller dies in any of the common metals: hot or cold rolled steel, stainless, high strength steels, coated steels, aluminum, copper or brass; from coiled strip ½" to 33" wide; in gauges from .003 to .312.

MAIL COUPON FOR FREE OPEN SHAPE CATALOG

This 48 page catalog OS-1049 illustrates (actual size) nearly 600 roller die, cold formed metal shapes for which rolls and dies are on hand, thus eliminating tooling costs to the purchaser of any of the shapes illustrated.

Send me catalog OS-1059.

Name ..... Title .....

Company .....

Address .....

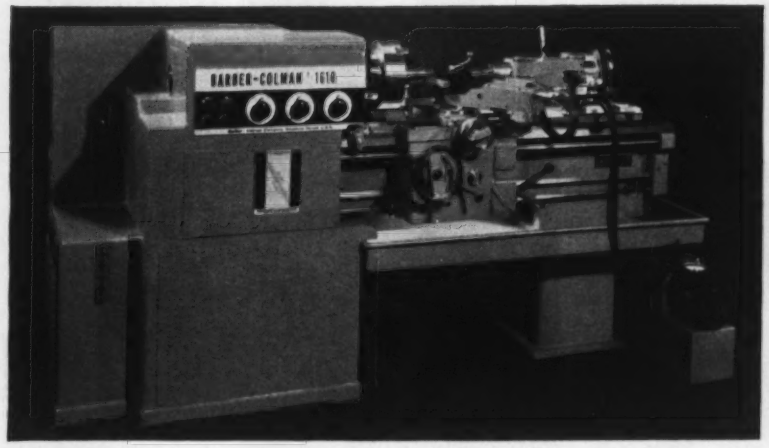
City ..... Zone.... State.....

VAN HUFFEL
TUBE CORPORATION • WARREN, OHIO

Where ideas have been taking shape in metal for over half a century

A New Concept in Lathes

New Barber-Colman
"specialist" lathe features
16" and 20" swing and infinitely
variable feeds and speeds



MMT-PE
MODERN MACHINE TOOLS
PRODUCTION EFFICIENCY

See the 1610 with tracer at 1960 Machine Tool Exposition . . . Booth No. 923.

Barber-Colman's new 1610 lathe with 16″ or 20″ swing and 6½ hp motor is a "specialist" lathe for turning, facing, and boring—and there's a place for it in every lathe department. Setup time is reduced, and production is increased 100% or more on many jobs. You might hesitate, at first, before buying a precision lathe that cannot be used for threading. But greater speed and feed control for those who want productivity and precision at a saving produces several practical benefits.

Low initial cost—You can purchase a Barber-Colman 1610 (*equipped with tracer attachment*) for approximately the same price as a toolroom lathe of the same rated capacity and quality. If other lathes are available for threading, this lathe is the most economical one to use for high-speed turning, facing, and boring. This lathe is also available as a 1610-13 for high-speed machining of parts which require 20″ swing over the ways.

Why put low-speed work on a high-speed lathe?

Since threading normally requires slow speeds, older toolroom lathes can be used economically for cutting threads. Put your turning, facing, and boring operations on this lathe to take full advantage of its high speeds (up to 2000 rpm) and infinitely variable feeds and speeds.

Control of feeds and speeds—Spindle speed of this 1610 is instantly, independently, and infinitely variable to any speed in its available range. Even during the cut, the operator can change spindle speeds just by turning a dial on the headstock. No time is lost shifting gears or stopping the machine.

Power feed to both carriage and cross slide is infinitely variable, also. There are no gears to shift—just a simple dial on the headstock. Feed per revolution can be varied from .0001″ to .488″, depending upon the speed range of the machine.

On high stock removal jobs, you can rough to within a few thousandths of final size, then take a quick finishing cut. The ease with which Class B operators can control feeds and speeds assures finer, more uniform finish, maximum machine utilization, and economical tool life on every job.

Simple tracer setups—Experience proves that less than 20 minutes is needed to set up the Barber-Colman hydraulic tracer. This is possible because the stylus can be positioned independently of the tool slide—the valve responds to pressure from any direction. Front mounting makes it easy to change over—chips don't pile up on the template. The lathe can be operated manually without removing the tracer, or the attachment can be replaced with the regular compound in less than ten minutes. Tracer operates from 0° to 90° with the work axis, and controls the machine consistently within .001″ on diameter or length.

Quality, versatility and economy

Convenient controls—particularly the five-position, turret-type longitudinal feed stop—simplify operation even at peak production efficiency. This feed stop is particularly advantageous for multiple-diameter turning because it eliminates scale readings and reduces skill requirements. It is one of many standard features on the 1610—simple, easy to use, and trouble-free.

Obviously, this is another Barber-Colman quality machine that will turn out toolroom quality work. Phone your Barber-Colman representative or write us for descriptive literature and complete specifications. Ask for Bulletin No. 9061-1.

Barber-Colman Company

BARBER COLMAN

510 Loomis Street, Rockford, Illinois

Specify

SANDVIK

Precision-Tailored

Spring Steel

FOR ACCURATE FLATNESS, STRAIGHTNESS, WIDTH, GAUGE AND EDGE FINISH *PLUS* SPECIFIC PHYSICAL PROPERTIES

SS-138

When you require specific physical properties combined with accurate dimensions in spring steel, call Sandvik.

From composition, through processing to the finished strip, Sandvik has had long experience in precision-control. That is why you find Sandvik steels used for feeler gauges, watch springs, compressor valves, camera shutters, reeds, shock absorbers and many other exacting spring steel applications.

Sandvik supplies cold rolled specialty strip steels —

- **In special analyses for specific applications.**
- **Precision-rolled thicknesses to fit your requirements.**
- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered — scaleless or polished bright, yellow or blue.**
- **With square, round or dressed edges.**

Sandvik stocks a wide variety of qualities and sizes. In addition Sandvik has Rolling, Slitting, Edge-Filing and Hardening and Tempering facilities.

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Gives Specific Data On Sandvik Cold Rolled and Hardened and Tempered Strip Steels. Catalogs leading types by application and lists finish, usual size range and chemistry. Send for your copy today.

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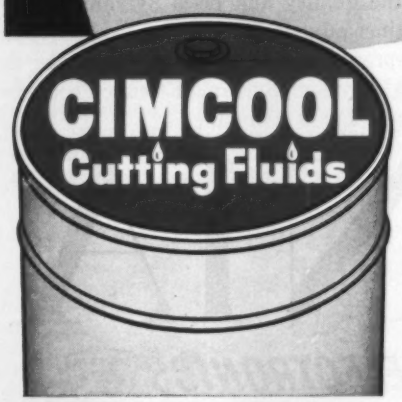
Sandvik Quality Steels

Heavy-Duty Improvement!

New chemical cutting fluid CIMPERIAL scores another success as a replacement to a cutting oil, in a heavy duty application. (Company name on request)

SALES REPORT
2.
on automatic screw machines. The operation was turning of stainless steel automotive water pump shafts. They were getting a lot of smoke and spray with a straight cutting oil.
We installed Cimperial at a 1:20 dilution. The result was an excellent job with no smoke and the work area much cleaner. No more slippery floor either. Cimperial left the parts so clean that an entire washing operation was eliminated.
Norm Schucht
Cincinnati Office



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL° — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS) — For every job requiring an oil-base cutting fluid.
ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

°Trade Marks Reg. U. S. Pat. Off.

This is a throat insert for the nozzle of a solid fuel rocket engine—and it is made possible by a dramatic new isostatic pressing and sintering operation at Sylvania. This operation enables Sylvania to make full use of tungsten, molybdenum and their alloys. It assures rocket and missile manufacturers of a steady and dependable source of supply for the desired refractory metal blanks and ingots.

Forging blanks are no problem for the Sylvania isostatic presses and sintering furnaces; nor are preform blanks for machining or electrodes for arc casting. Sylvania is also equipped to "green machine" the blanks or furnish them to exact finished tolerances.

If refractory metals are your materials, and special shapes, sizes or quantities your problem, you'll find the quality and price Sylvania offers to be of distinct advantage. For details, call your Sylvania representative, or write Chemical & Metallurgical Division, Sylvania Electric Products Inc., Towanda, Pennsylvania.

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

LIMA *35-ton capacity* Truck Crane unloads German freighter *Leada* . . . at Toledo Marine Terminal after sailing the St. Lawrence Seaway.

Lima Truck Cranes are versatile, highly mobile, top-quality machines designed and built for precision lifts. Experience has proven that they can be depended upon to outperform other makes of cranes year after year. And maintenance requirements are lower because Limas are better built.

For example, all parts subjected to extra wear are induction hardened; extra-strong and rigid rotating base turns on tapered conical rollers between twin roller paths; power take-off and swing gears are enclosed, running in oil; special steel and anti-friction bearings are used throughout.

Limas can be stripped down with speed and ease for reduced-weight highway travel at automotive speeds from place to place. Lima accepts undivided responsibility because it manufactures the entire unit, including the carrier.

Optional attachments permit it to be used with shovel, dragline, clamshell or pullshovel for digging or handling bulk materials or with magnet for metals.

There's a time and money-saving Lima ideally suited for every industrial application from unloading ocean freighters to recovering scrap metal. Truck cranes to 75 tons; wagon cranes to 60 tons; crawlers to 140 tons. Ask your nearby Lima distributor for facts and figures now. Or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

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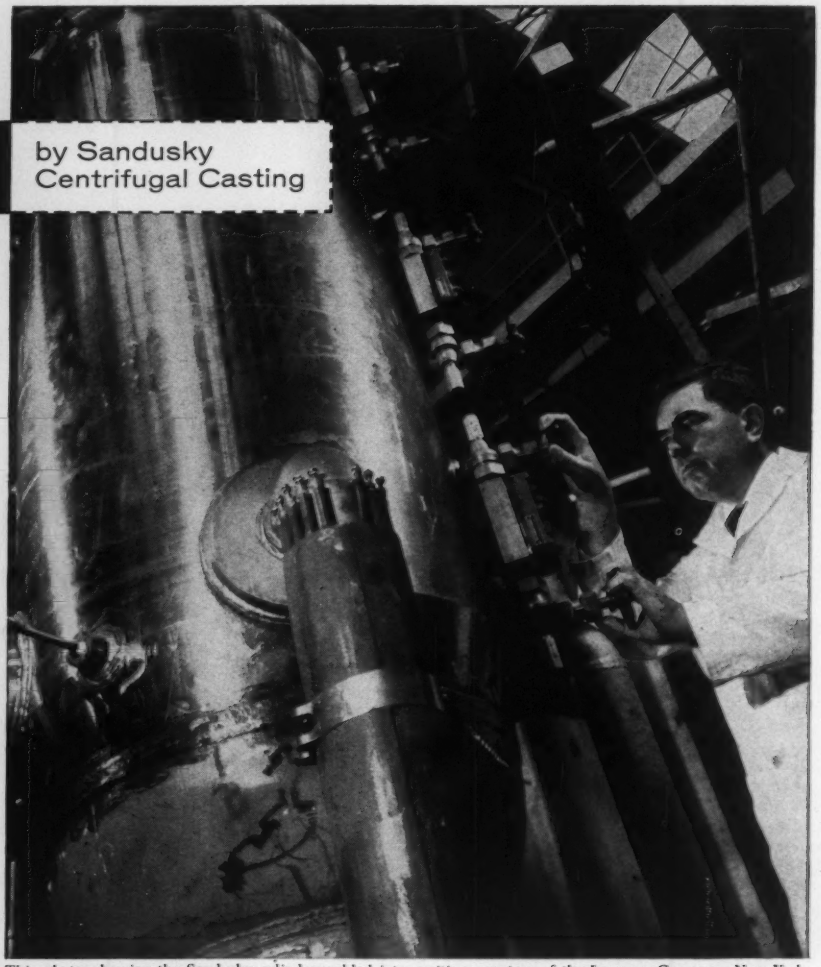
Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment

BALDWIN BLH LIMA-HAMILTON

SOLVED: by Sandusky Centrifugal Casting



This photo, showing the Sandusky cylinder welded into position, courtesy of the Lummus Company, New York. New York who fabricated, assembled and tested the completed loop before shipping it to the ETR site in Idaho.

Nuclear Test Loop Uses Sandusky Centrifugal Casting as Pressurizer Cylinder

A Sandusky Centrifugal Casting is the main cylindrical component of an electrically heated pressurizer, designed by Knolls Atomic Power Laboratory to Section VIII, of the ASME Code (Unfired Pressure Vessels) for use in the new Engineering Test Reactor facilities at Idaho Falls, Idaho.

This 66¼" long cylinder, 27" O.D. with walls 2½" thick, was centrifugally cast of an 18-8 stainless steel (SA-351, Grade CF-8) for the extra corrosion resistance required under nuclear loop service conditions: demineralized water at temperatures to 650°F and pressures to 2500 PSI.

O. G. Kelley Co., Boston, to whom we delivered this 2-ton, fully machined cylinder, welded on the forged heads and nozzles, radiographed the welds, and hydro tested the completed vessel to 4300 PSI.

This is another example of the adaptability of Sandusky Centrifugal Castings to applications demanding the highest order of quality. They may well offer you a practical and economical answer to your cylindrical needs, also.

We are producing cylinders and piping in diameters from 7" to 54"—in lengths to 33 ft.—in a wide range of ferrous and non-ferrous alloys. Write for Bulletin 300, for more complete technical information on the Sandusky process and product application data.

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FOUNDRY & MACHINE CO.

SANDUSKY, OHIO—Stainless, Carbon, Low-Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys

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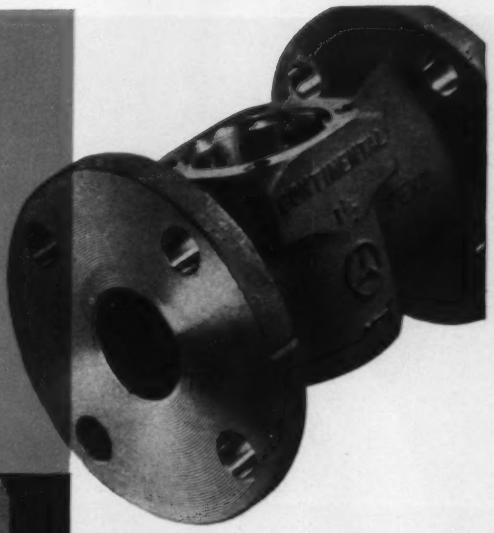
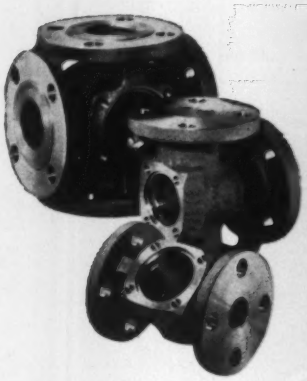
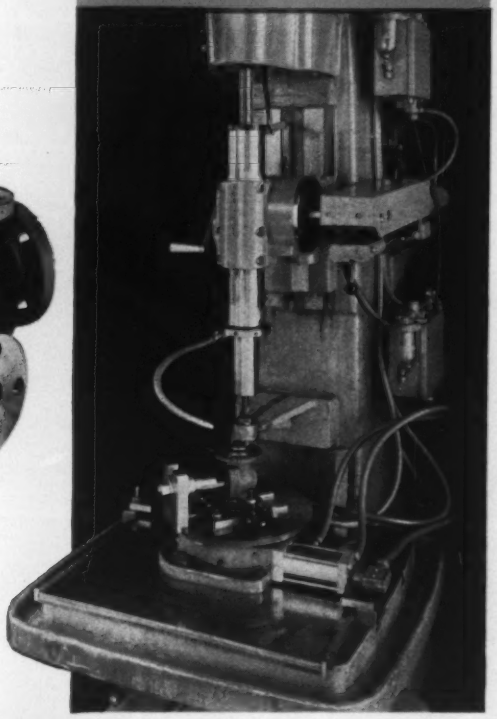
In this case, on valve body flanges*







Problem: "On this Continental Manufacturing job, we have various valve body sizes in tough-machining materials, hole diameters to ¾", and small lot runs up to 25 pieces. To make it a profitable operation, we must have low-cost equipment with fast setups for quick changeovers."

Answer: Standard 21" CINCINNATI, "tailored" with standard air-operated feed and table indexing . . . simple, flexible fixturing for approximately 5 minutes setup time . . . 2½ to 5 minutes cycle time depending on material . . . total equipment cost slightly under $4000!

Let Cincinnati Lathe and Tool service engineers tailor a versatile new CINCINNATI Drilling Machine *to suit your needs exactly!* You get a specialized unit made with the right combination of standard accessories—the most practical approach to LOWEST COST PER DRILLED HOLE!

The story of another of many shops, large and small, who have brought their drilling problems to our service engineers for help. Ask your Cincinnati Lathe and Tool Dealer for service engineering on your drilling problem. If you can't reach him immediately, wire us—collect!

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Cincinnati 9, Ohio

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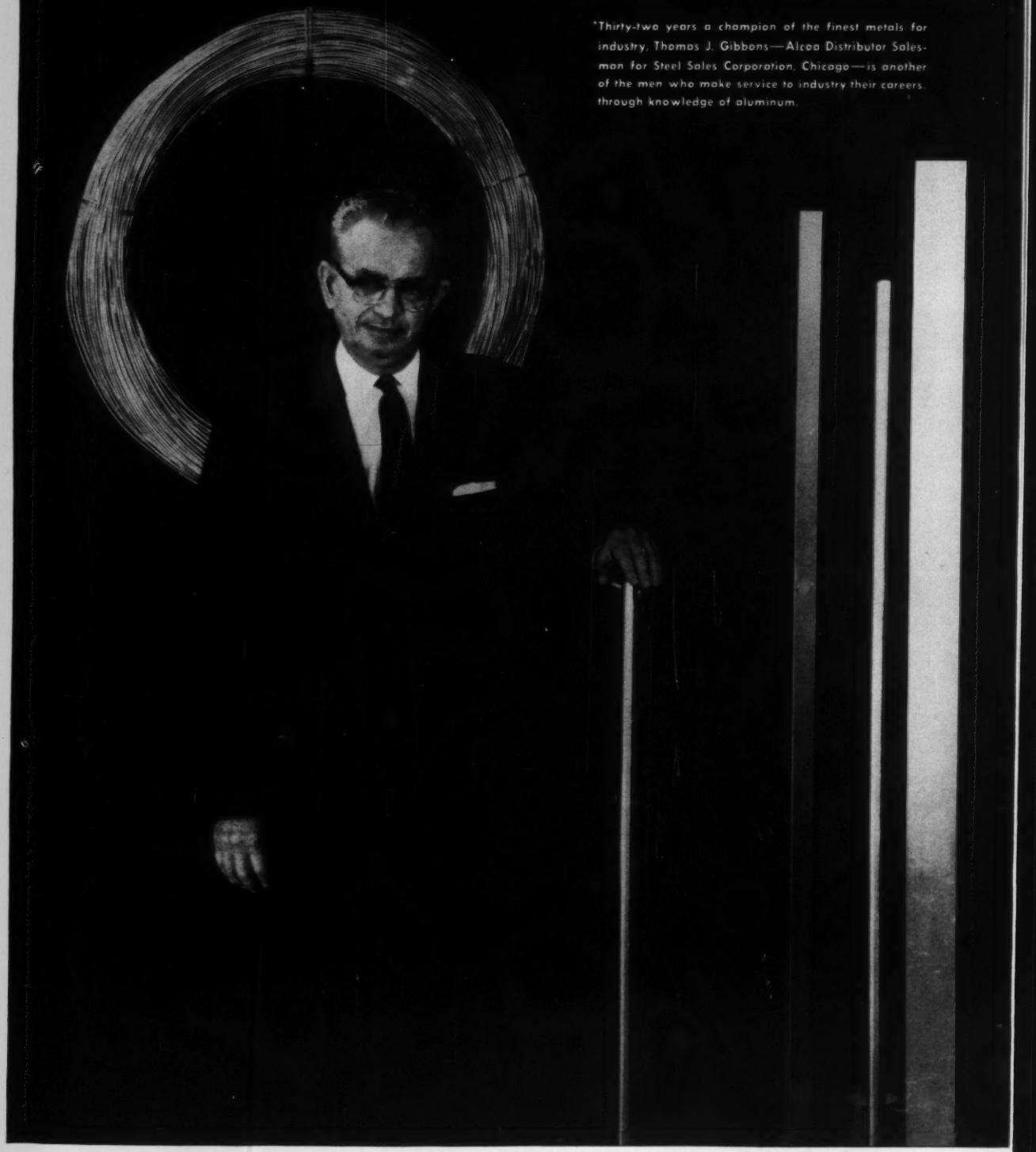
*Thirty-two years a champion of the finest metals for industry, Thomas J. Gibbons—Alcoa Distributor Salesman for Steel Sales Corporation, Chicago—is another of the men who make service to industry their careers, through knowledge of aluminum.



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Alcoa® Aluminum Wire, Rod and Bar . . . light in weight, easier to handle, and offering you important cost advantages . . . is now readily available from local warehouse stocks. You can now receive immediate "from-stock" delivery of a wide variety of sizes, shapes and alloys from your local Alcoa Distributor Salesman—*The Aluminum Man!*

He can deliver fast—and he can supply solutions to your problems fast, too. Call on *The Aluminum Man* for *anything* concerning aluminum. He can give you specifications, technical data and many valuable suggestions. His advice and help, reflecting the treasure of technical knowledge amassed by Alcoa, the aluminum pioneer behind these products, are yours for the asking. Always specify *Alcoa Aluminum* — the light metal with the bright future that's being seen in more places—more and more! Aluminum Company of America, 926-E Alcoa Building, Pittsburgh 19, Pa.

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Tulsa 13
Metal Goods Corp. (Temple 6-2561)

OREGON
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*Pacific Metal Co. (Capitol 7-0693)

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*Edgcomb Steel Co. (Garfield 3-6300)
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Metal Supply Co. (Center 6-0220)
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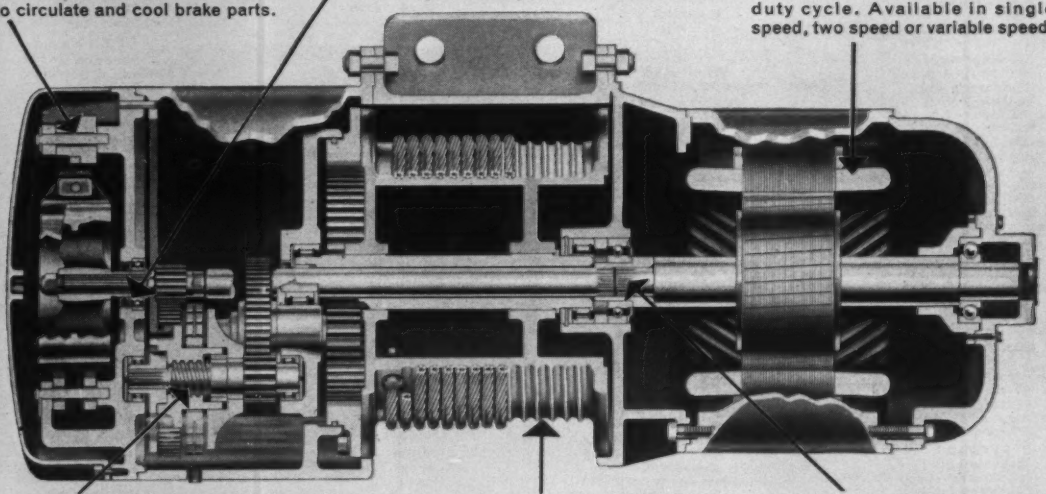
You Can't Buy a Low-Priced Hoist with the Outstanding Performance and Maintenance Features You Get as Standard Equipment from Wright

Feature for feature, you are years ahead with a WRIGHT *Speedway* Electric Hoist. Designed and manufactured to meet the varied demands of modern high speed production, *Speedway* Hoists give you the safety, adaptability, ruggedness and efficiency which you can't get in a low-priced hoist. Many of these performance and maintenance features are exclusive with WRIGHT. So if you are considering the purchase of an electric hoist, it will pay you to investigate the advantages of WRIGHT *Speedway* Hoists. For complete information, write our York, Pa., headquarters for **Catalog E-58.**

Motor Brake is the solenoid-operated external expanding jaw type. Fan-shaped brake wheel induces air to circulate and cool brake parts.

Bearings • Precision ball or roller bearings support all moving shafts—insure high efficiency, durability and low maintenance.

Motors are fully enclosed, ball bearing type. Built to NEMA Specifications. Rated on basis of 30-minute duty cycle. Available in single speed, two speed or variable speed.



Mechanical Brake is of the Weston multiple disc type operating in bath of oil. Brake linings cemented to braking members instead of being riveted, thus increasing braking area for greater duty cycle.

Grooved Cable Drum is fabricated from rolled steel sections, machine-grooved to take full lift without overwinding. Extra wraps give added safety when hook is in lowest position.

Splined Connections transmit torques with minimum stress and distortion. Permits motor replacement with less effort even when hoist is under load.

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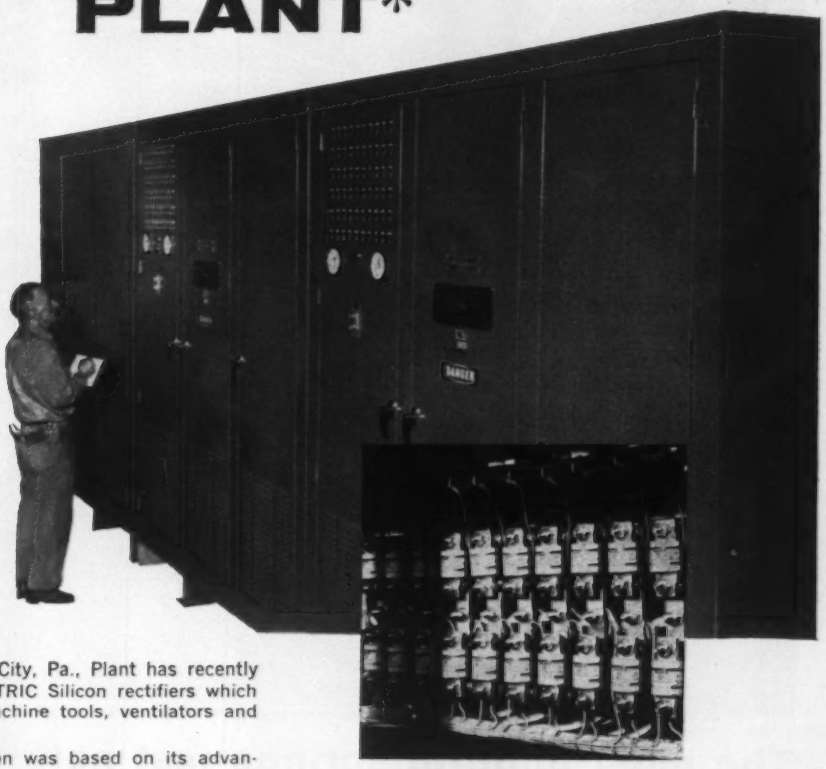
TRADE MARK

1500 KW SILICON POWER INSTALLED at COOPER-BESSEMER PLANT*



The Cooper-Bessemer Corp.'s Grove City, Pa., Plant has recently installed three 500 KW RAPID ELECTRIC Silicon rectifiers which are now supplying heavy cranes, machine tools, ventilators and pumps with d-c power.

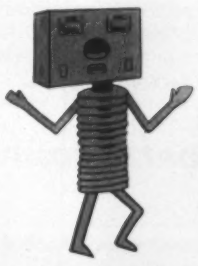
Cooper-Bessemer's selection of Silicon was based on its advantageous (inherent) high voltage characteristics and resulting high efficiency and power factor.

Specially designed protective systems, together with Silicon's natural longevity will insure continuous operation for many years (See insert).

For further information on this installation or other silicon installations and applications write or call, Shop Materials Company**, 733 Washington Road, Pittsburgh 28, Pennsylvania.

*Machinery Builders, (Engines and Compressors.)

**Representing RAPID ELECTRIC in the State of Pennsylvania.



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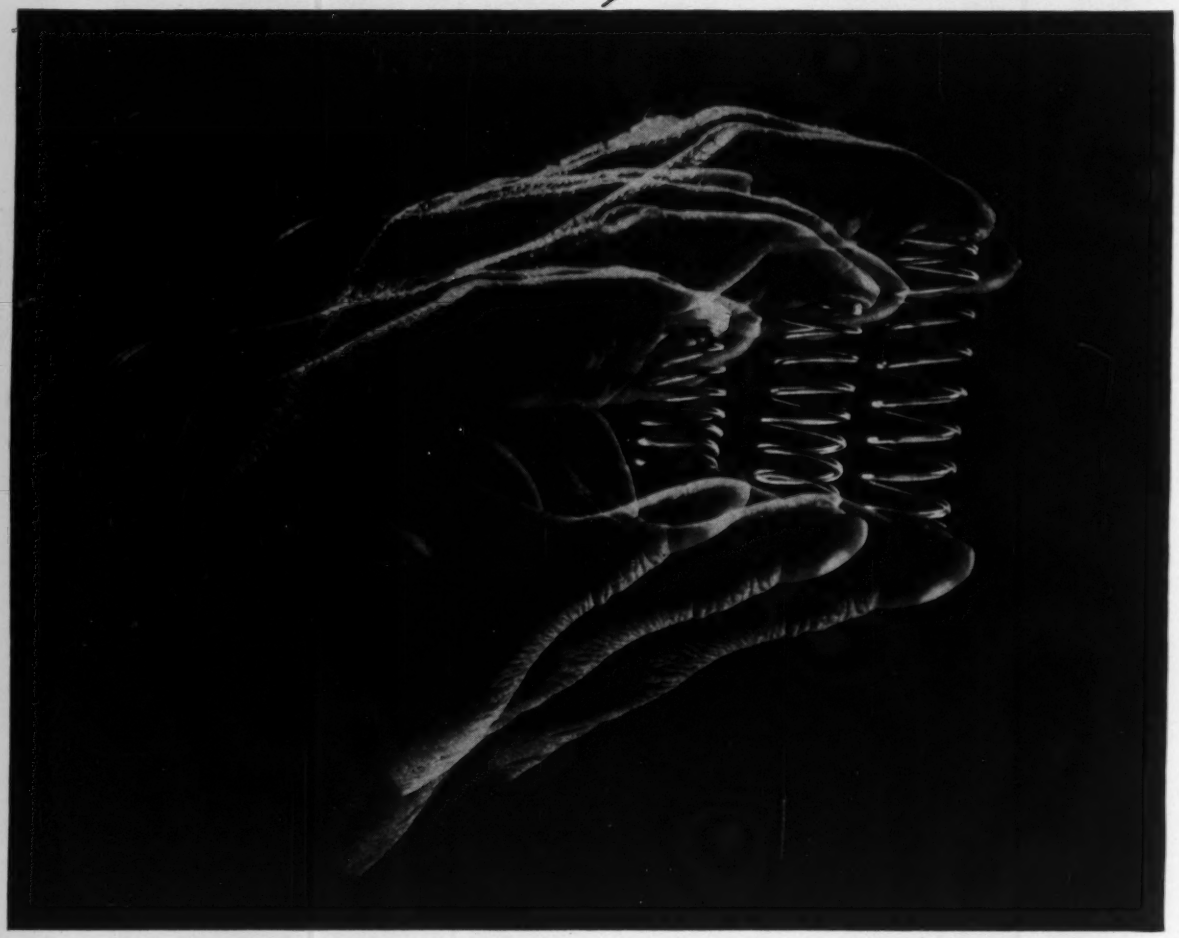

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RIVERSIDE-ALLOY SPRING MATERIALS

It's an acknowledged fact in the trade that Riverside-Alloy produces the finest spring materials for corrosion resistant and high temperature applications . . . materials more uniform in *all* the properties that make *good* springs.

But what about the specific alloy and shape you need? Riverside-Alloy is a *single, dependable source* for spring material in Stainless steel (Isoloy), Phosphor bronze, Nickel silver, Monel, Inconel, Inconel "X" and Duranickel . . . in wire, flat wire and strip.

Write today for a copy of the new "Spring Materials Digest" and other specific information. We have the people who can talk *springs. Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.*

Visit Booth #148 at the Southwestern Metal Exposition • Visit Booth #142 at the design Engineering Show

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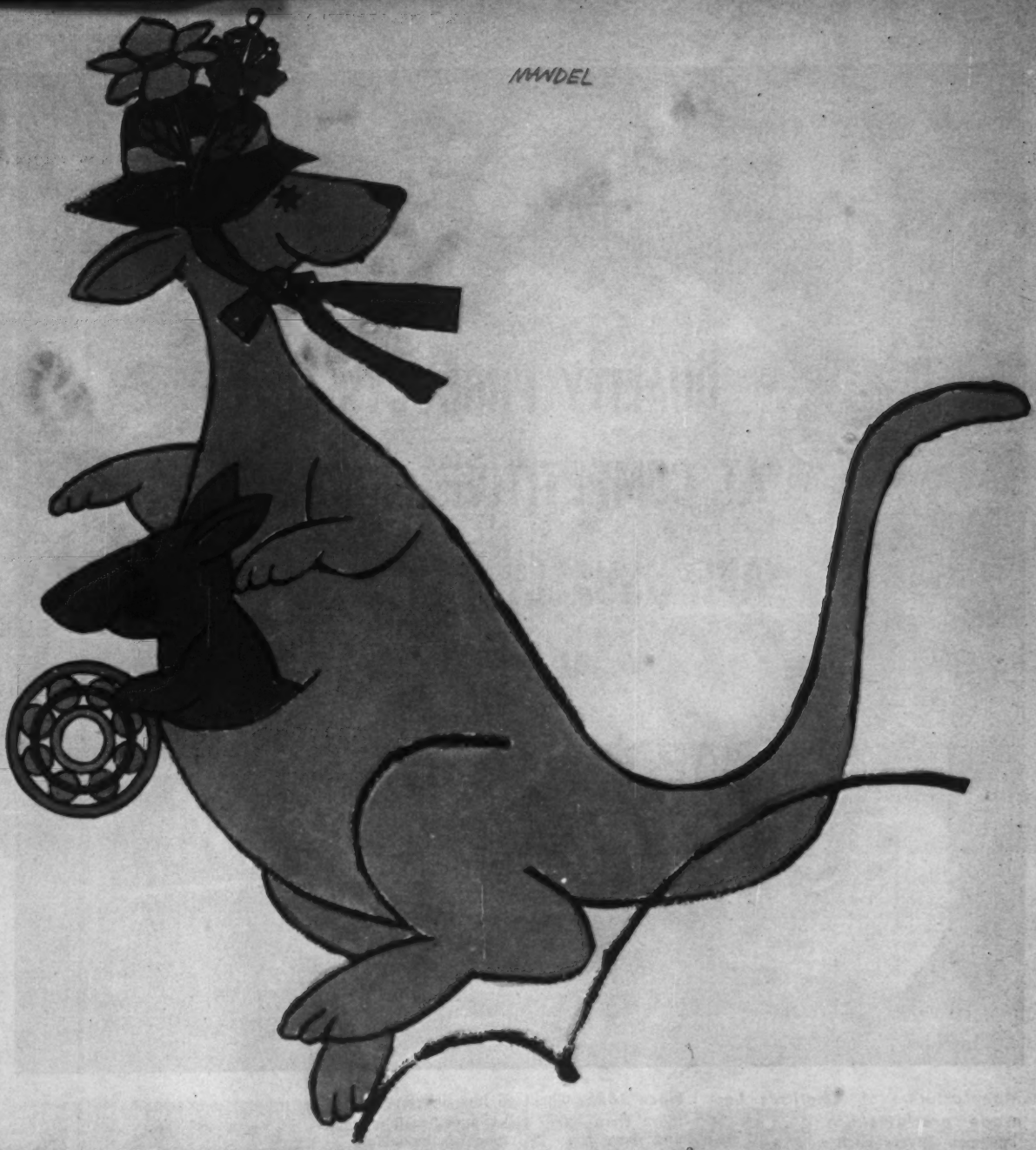
PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and piping fittings, roll formings and stampings, wire rope and strand.



HIGHER SPEEDS

The raceway of a Federal Ball Bearing is designed to do just what its name implies—provide a track around which balls can whirl at lightning speeds, without fatigue. To make sure they do, every Federal Bearing starts with tough SAE 52100 steel. Scores of production and quality control steps later, a perfect ball bearing emerges, primed to perform its high speed tasks.

Smoothly. Quietly. Efficiently. And where do we send these smooth, quiet, efficient bearings? Our customer list is a veritable who's who of American industry. We'd like to include your name, too. Our catalog lists over 12,000 ball bearing sizes and hundreds of types. Send for it today.

THE FEDERAL BEARINGS CO., INC., Poughkeepsie, N. Y.

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One of America's largest ball bearing manufacturers

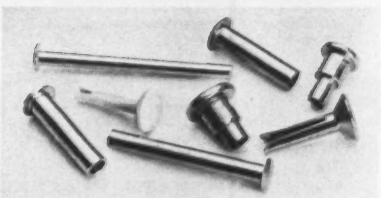
FEDERAL ON FILM—A 16 mm. color sound film takes you through our 400,000 sq. ft. plant.—Loaned free. Just ask for it.

Manufacturers of America's best made products use millions of Thomson Rivets each year . . . because value analysis proves that rivets belong in product-improvement and cost-reduction programs.

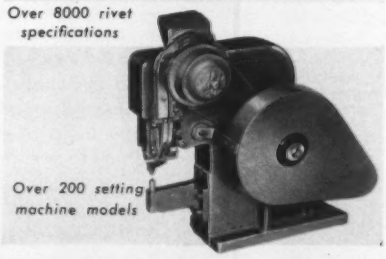
When you specify Thomson Rivets, you get cold-formed strength, dimensional accuracy and faster assembly. You get lower total fastening costs inherent in machine-set rivets. You also get the extra benefit of 75 years' experience in keeping rivets and rivet-setting machines in step with industrial progress.

Since 1885, Thomson has developed more than 8,000 rivet specifications and more than 200 machine models. They provide ready answers to special and routine fastening problems.

On-the-spot assistance by your nearby Thomson Fastening Man, listed in the Yellow Pages, simplifies selection of the rivet-and-machine combination that will improve your products and cut your costs. Send for your free copy of "Cost-Cutting Facts about Fastening with Rivets", address your letter to Dept. 524 . .



Over 8000 rivet specifications



Over 200 setting machine models

JUDSON L. **THOMSON** MFG. CO.
WALTHAM 54, MASSACHUSETTS
Thomson (Canada) Rivet Co. Ltd., Gananoque, Ontario

NEW YORK • ILLINOIS • INDIANA • OHIO • MICHIGAN • PENNSYLVANIA • CALIFORNIA • FLORIDA • TEXAS • SOUTH CAROLINA • MISSOURI

Combining corrosion resistance, exceptional structural strength, hardness, and wear resistance:

ASARCON® NI-VEE* BRONZES

The unusual strength, exceptional hardness and excellent wearability of these continuous castings of Ni-Vee copper alloys are still further increased by simple heat treatment. Asarcon Ni-Vee castings are highly qualified for rugged heavy duty service, especially where corrosion is a problem. They are available as rods, tubes, and special shapes, in lengths up to 20 feet, diameters from 13/32" to 9⅛", only 1/32" away from finished dimensions. And they are guaranteed to be free of porosity, sand inclusions, and blow holes. For further information, write to Continuous Cast Department, American Smelting and Refining Company, Barber, N. J. or Whiting, Ind.

*NI-VEE is a registered trademark of International Nickel Company.

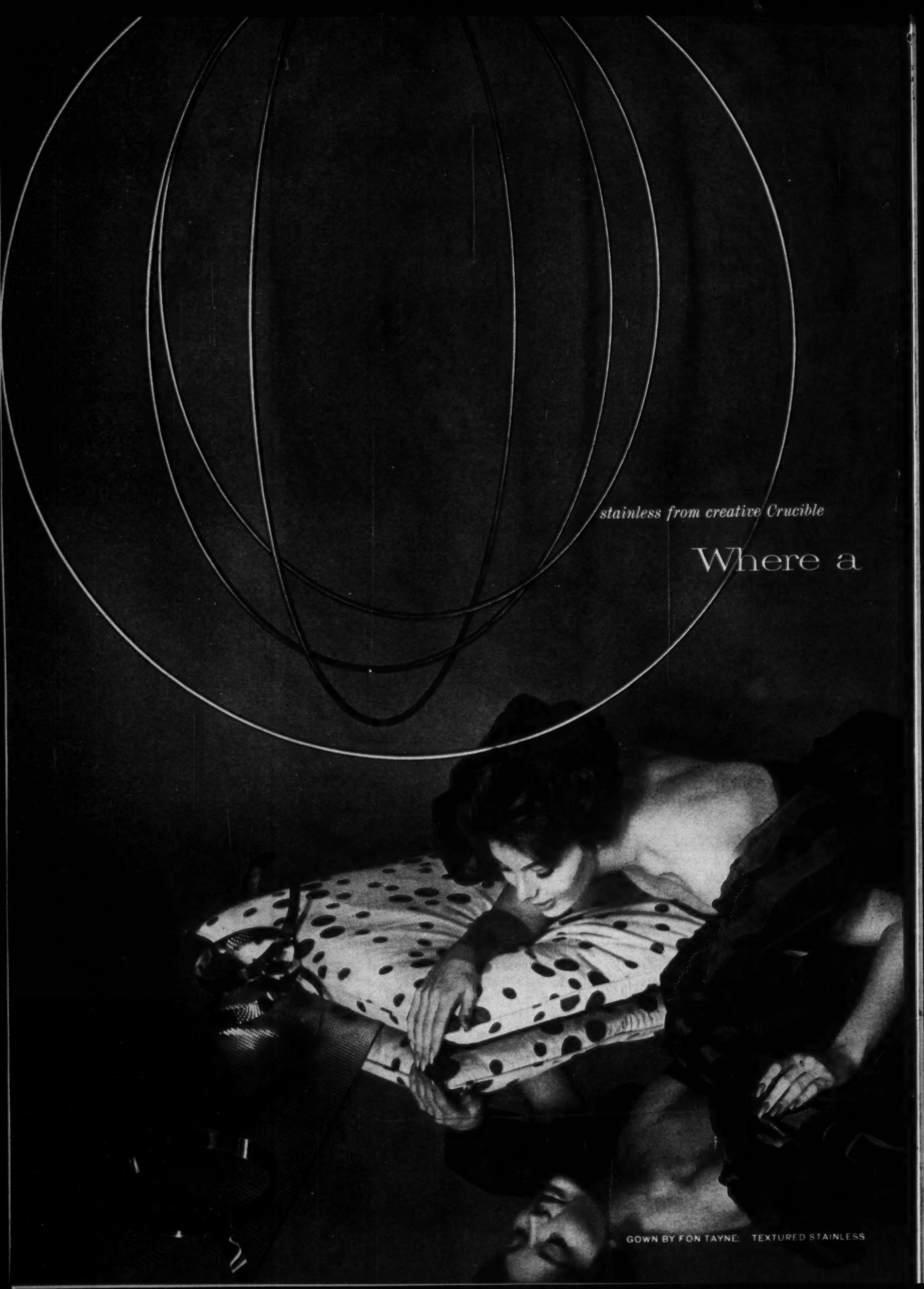
One of the 20-foot continuous-cast Asarcon Ni-Vee gate stems for sluice gates at Lockport, Ill. powerhouse flood control project.

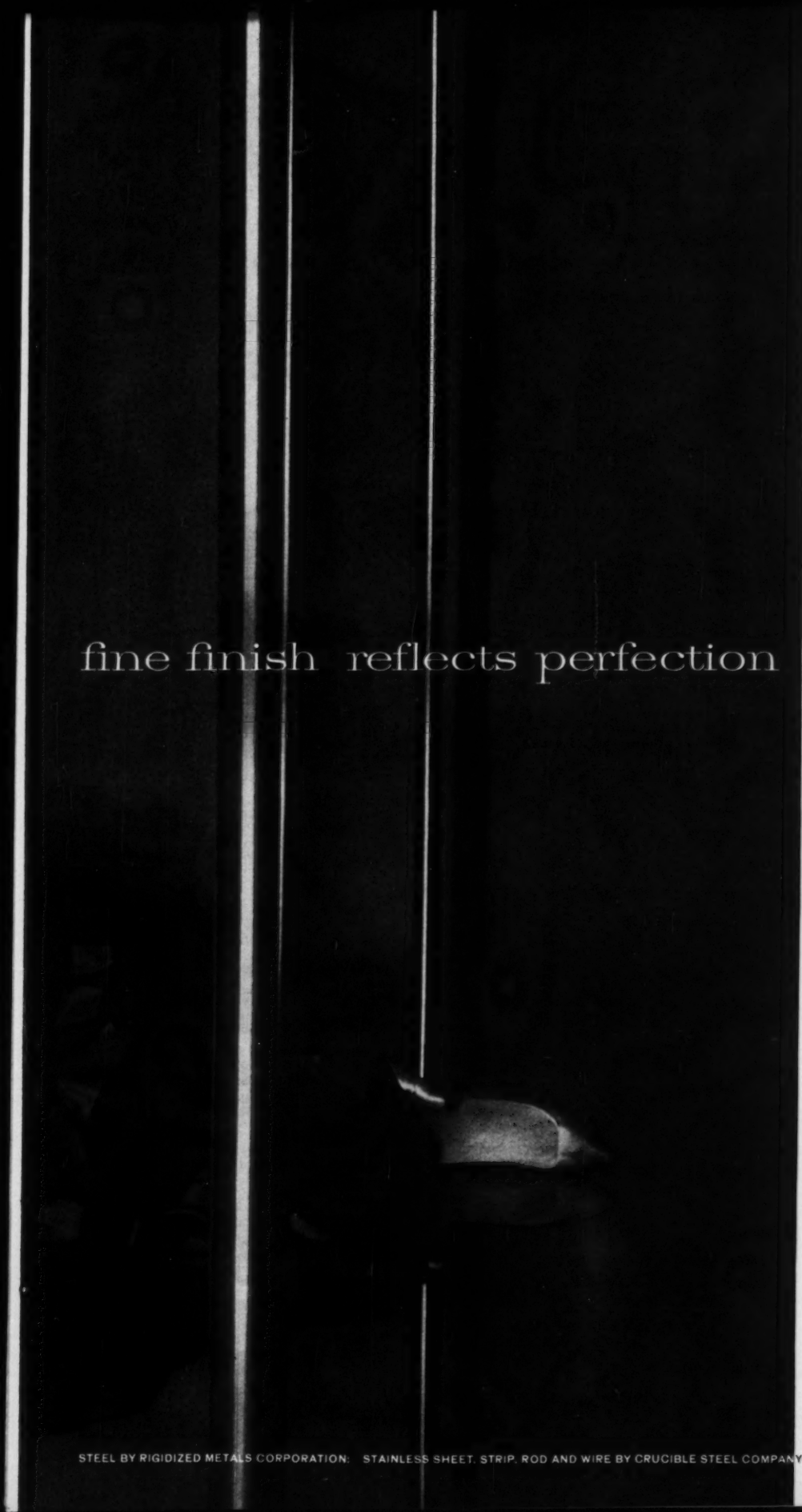
ASARCO

AMERICAN SMELTING AND REFINING COMPANY

CONTINUOUS CAST DEPARTMENT

West Coast Distributor: Kingwell Bros., Ltd., 457 Minna Street, San Francisco, Calif. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal. Distributors in many principal cities.


stainless from creative Crucible
Where a
GOWN BY FON TAYNE: TEXTURED STAINLESS



The lustrous finish of Crucible stainless reflects steelmaking perfection. But steelmaking to exacting specifications is only the beginning of engineering and warehouse services that are continually available to you. To see how they'll help you enhance your product with stainless steel, just call or write the nearest of the 34 local Crucible service centers.

CRUCIBLE

Stainless Steel

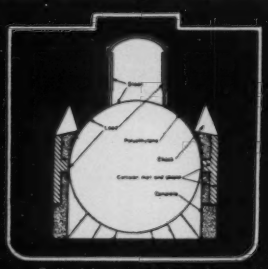
STEEL BY RIGIDIZED METALS CORPORATION: STAINLESS SHEET, STRIP, ROD AND WIRE BY CRUCIBLE STEEL COMPANY OF AMERICA, PITTSBURGH 30, PA.

500 TONS OF LEAD

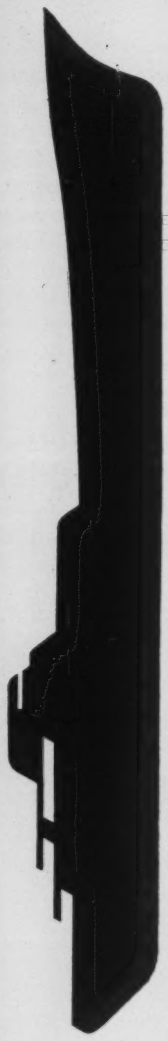
Provide The Shielding In The

N. S. SAVANNAH

...The World's First Nuclear-Powered Merchant Ship



Cylindrical container for the reactor steam plant.



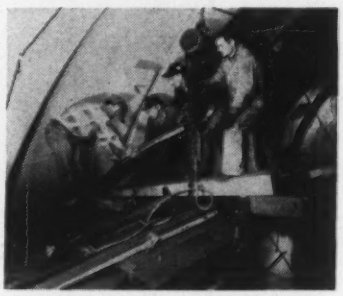
The 20,000 ton N. S. Savannah
Speed: 21 knots.
Cruising radius: 350,000 miles.

PB-150

The 20,000 ton N. S. Savannah contains some of the most advanced radiation shielding yet developed. Over 500 tons of lead, along with water, concrete and polyethylene, provides such a high degree of safety to the crew and passengers that a man standing on the main deck will receive no more radiation from the powerful reactor under his feet than he will from the sky.

The cylindrical container for the reactor steam plant is a steel pressure vessel averaging two inches thick. It measures 35 feet in diameter and is 51 feet long. The radiation shield is divided into two parts. The first, which surrounds the nuclear reactor is composed of a shell of water thirty-three inches thick and approximately three inches of lead. The second, which covers the entire containment vessel, is composed of concrete, polyethylene and a shell of lead four to eight inches thick.

Lead is a preferred material for radiation shielding because of its density. Shielding effect against the deadly gamma radiation is directly proportional to the density of the shield, and lead is the densest of all the commonly available materials. It, therefore, provides the best protection per unit of shield thickness at the lowest cost. Thus lead — one of the oldest metals known to man — is a major factor in the rapidly expanding utilization of man's newest discovery, Nuclear Energy.



500 tons of lead in the form of sheets 6x3 feet and 1 or 2 inches thick were preformed to the cylindrical shape with a rolling jig. Spherical end sections were die formed.

Look Ahead
With ***LEAD***

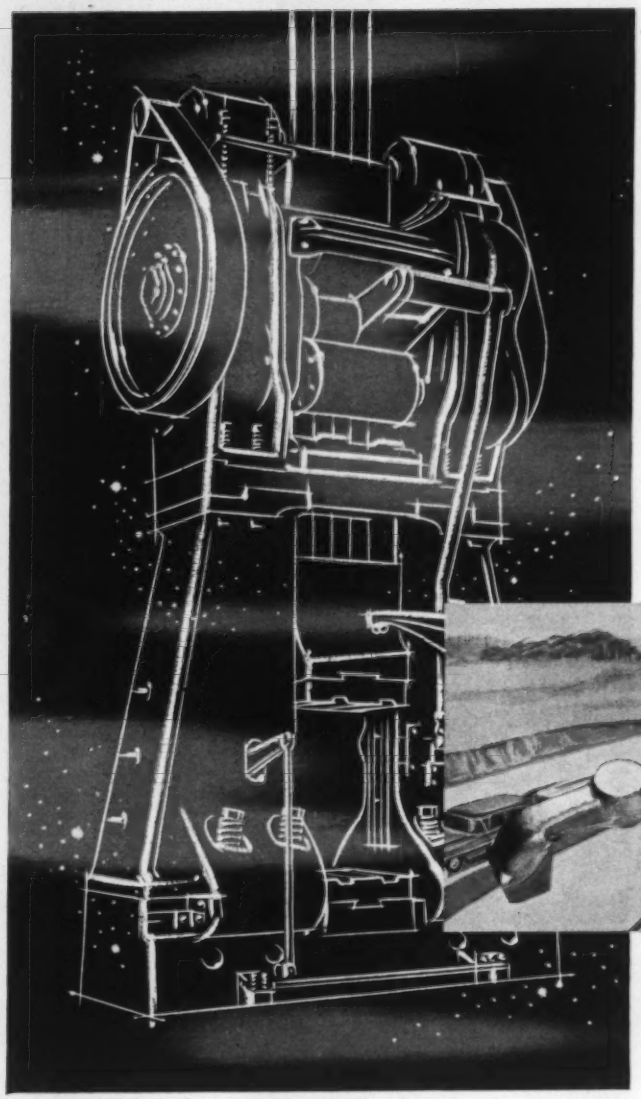
ST. JOSEPH LEAD CO.

250 Park Avenue

New York 17, New York

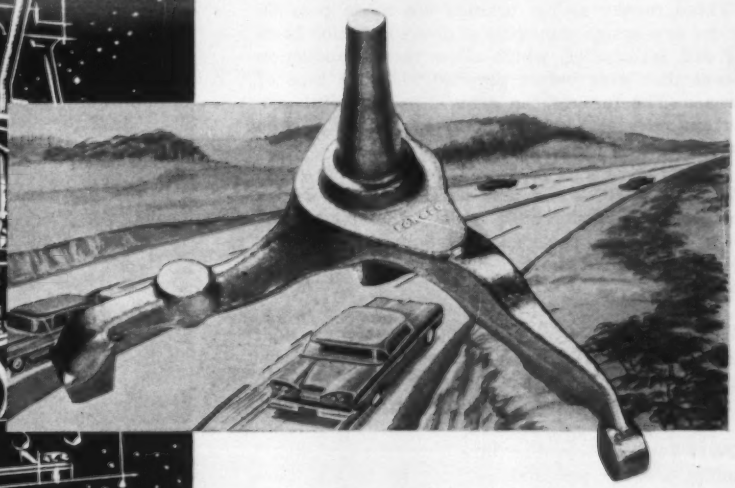
ST. JOE

THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES



Modern board-lift forging hammer

SHOCK-STRENGTH of steering spindle soars by designing it to be forged



By designing front-end spindles to be forged, automobile and truck manufacturers practically eliminate danger of failure of these vital parts, even under sudden turning stress that can reach thousands of foot-pounds.

Start your designs by planning to use forgings everywhere there's a high degree of stress, vibration, shock, or wear. Forged parts withstand them all better than parts made by other fabrication methods. And forgings have no hidden voids to be uncovered after costly machining hours have been invested . . . the hammer blows or high pressures of the forging process compact the *better* forging metal, make it *even better*.

Write for literature on the design, specification, and procurement of forgings.

SEE THE WHOLE STORY OF FORGINGS
BOOTH 832
DESIGN ENGINEERING SHOW.
NEW YORK, MAY 23-26.

When it's a vital part, design it to be FORGED

Drop Forging Association • Cleveland 13, Ohio

Names of sponsoring companies on request to this magazine

CUT ANNEALING COSTS 50%, IMPROVE STRIP QUALITY

New General Electric Stainless Strip Furnace* eliminates pickling, produces steel up to six times faster than other bright annealing furnaces.

Important design innovations on General Electric's new continuous bright annealing furnace now make possible annealing cost reductions up to 50 percent, as well as improved corrosion resistance, surface appearance, and physical properties of the strip.

These money saving benefits are made possible by the new design principles of *direct radiation heating* and *jet cooling*, which allow faster production speeds than ever before possible with this type of furnace. The furnace can achieve such typical production rates as 7700 lbs/hr of 24-inch strip, even more for wider strip.

FASTER HEATING—The new heating section design utilizes molybdenum units mounted on high-purity brick, backed by a special insulation. Heating is by direct radiation without muffles. Thus, faster, more uniform heating is achieved.

FASTER COOLING—Jet coolers, driven by gas-tight motors, direct streams of hydrogen at right angles against the strip for faster, uniform cooling with minimum grain growth and carbide precipitation.

LOWER COSTS—Less downtime is required, no metal muffles are needed, and you get up to six times more production, compared with other bright annealing furnaces. There's no acid maintenance, replacement, or disposal as in conventional anneal and pickle operations. Annealing costs can thus be reduced as much as 50 percent.

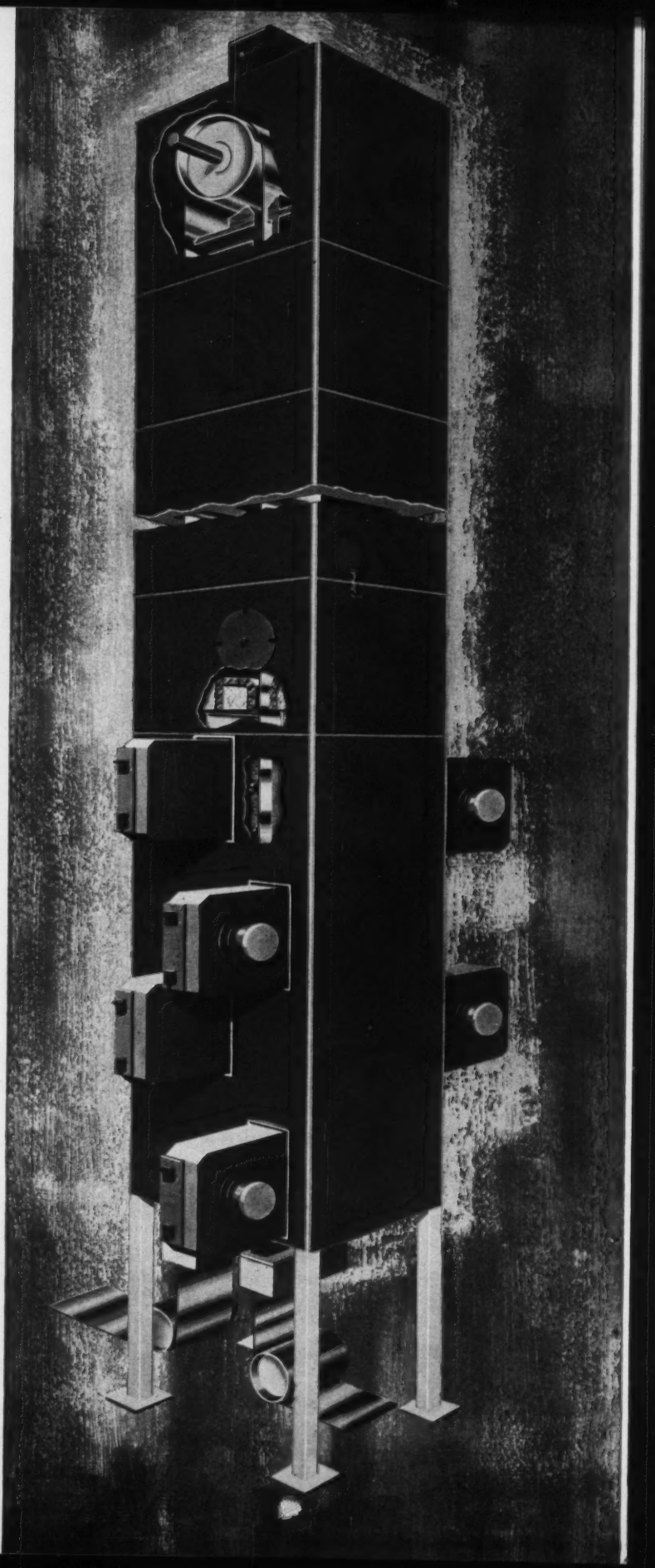
HIGHER QUALITY STRIP—Vertical construction reduces hot strip tension and improves appearance. Since furnace has only one roll which does not touch hot strip, surface scratching is eliminated. Faster heating and cooling rates also improve corrosion resistance and physical properties.

Find out today how the new General Electric Stainless Steel Furnace can increase production, improve strip quality, and save you money in your annealing operations. Contact your G-E Sales Engineer, or write for new bulletin GED-4124. General Electric Co., Schenectady 5, New York. 756-03

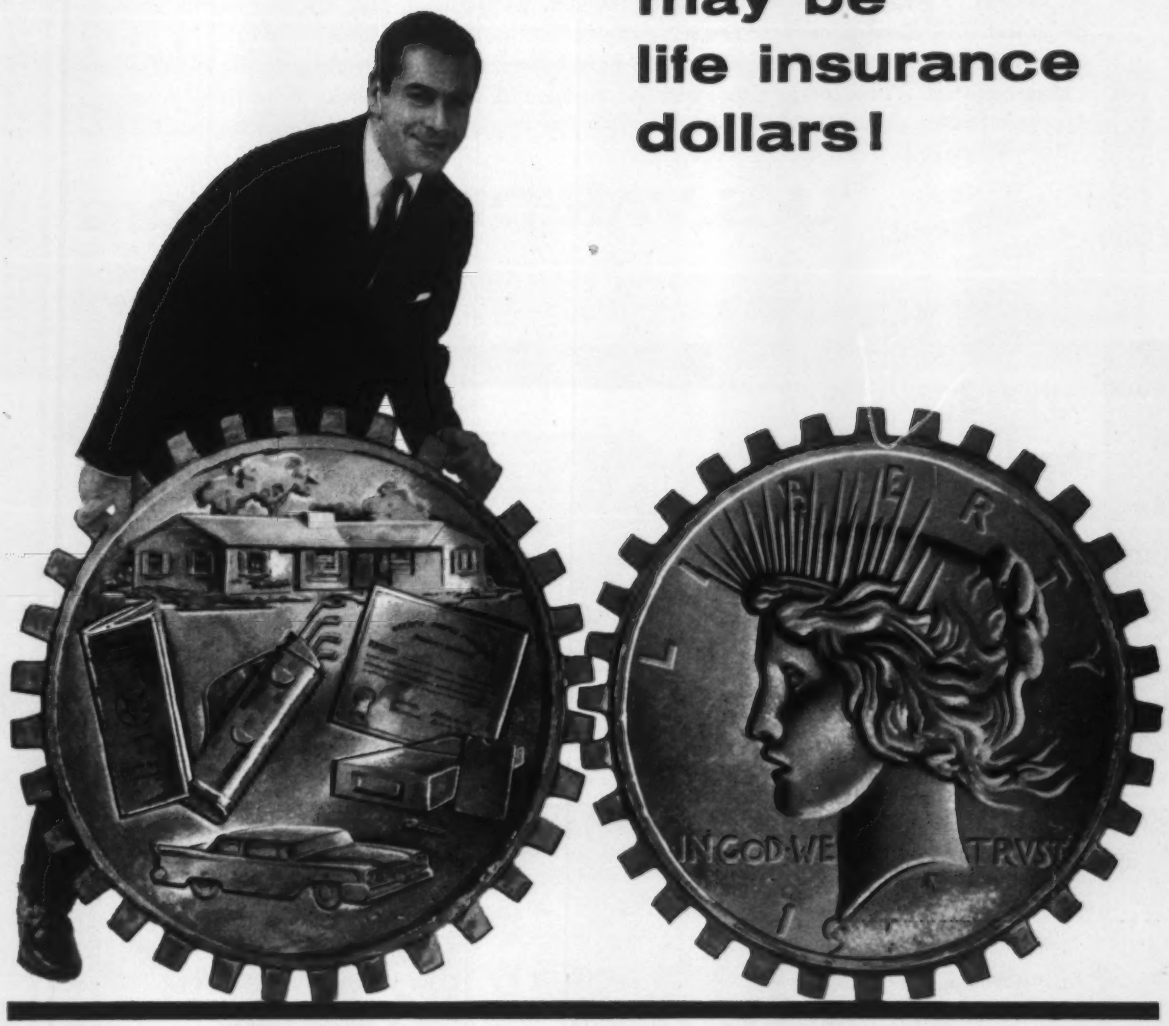
* Patents Pending.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Your most effective dollars may be life insurance dollars!



Chances are the dollars you are now putting into life insurance can be stretched further with no increase in cost to you!

The Ætna Life Estate Control Plan coordinates your life insurance with *all* the assets that go into your estate. Then it develops the plan that uses everything to maximum advantage. You'll find your life insurance dollars are more effective dollars.

The Estate Control Plan is exclusive with Ætna Life, a pioneer in family programming. It is available to you through your local Ætna Life representative.

Ætna Life's Estate Control Plan works for you!

- **Assures maximum effectiveness from your present life insurance**
- **Coordinates all your assets**
- **Balances need with income**
- **Gives you complete private record**

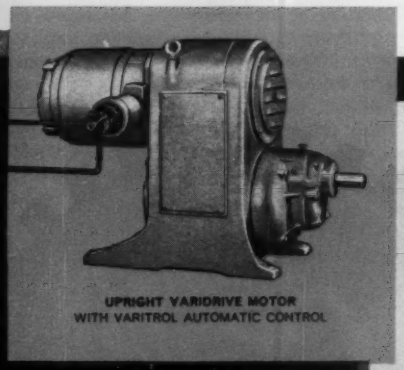
ÆTNA LIFE
INSURANCE COMPANY
Hartford 15, Connecticut

Affiliates: Ætna Casualty and Surety Company
Standard Fire Insurance Company

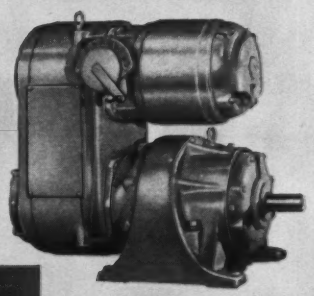
10,000 CONFIGURATIONS— EACH WITH 10,000 SPEEDS!

Choose from thousands of different shapes, sizes, attitudes, mountings, horsepowers, enclosures, ungeared or geared combinations—choose the U.S. VARIDRIVE MOTOR that exactly fits your application! U.S. introduced the *first* self-contained a.c. motorized variable speed drive for industry —in 1932! Ever since, U.S. design engineers have been developing new Varidrives to combine new characteristics... new controls, too: Manual, mechanical, electrical remote control, and automatic control. Ratings available: **¼ to 75 h.p.** *(Send for free 16-page color Varidrive Bulletin, No. F-1797.)* For your variable speed application, specify:

U.S. VARIDRIVE motors

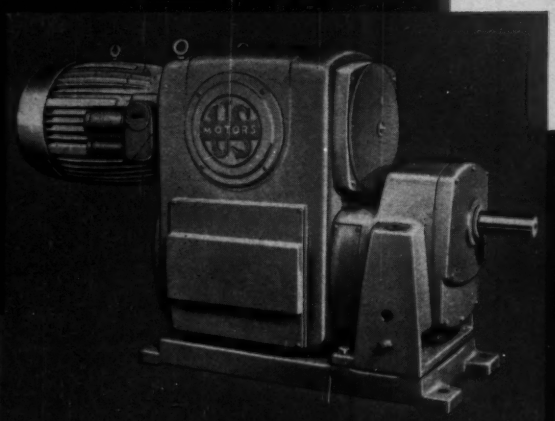


UPRIGHT VARIDRIVE MOTOR
WITH VARITROL AUTOMATIC CONTROL

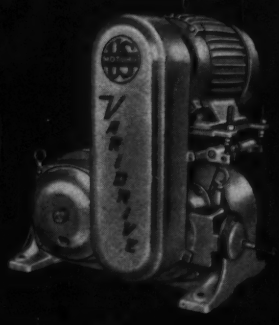


VARIDRIVE
WITH INTEGRAL GEARING, MOTOR AND TAKE-OFF SHAFT SAME SIDE

SMALLEST VARIDRIVE
1/4 TO 1 H.P.
WITH HAND CONTROL ASSEMBLY



VARIDRIVE MOTOR WITH
INTEGRAL RIGHT-ANGLE
WORM-GEARING

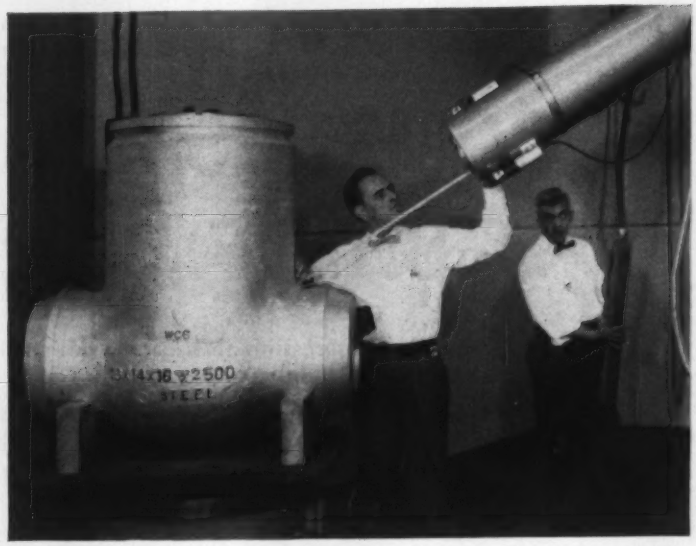


MOTOMOUNT VARIDRIVE
WITH STANDARD
FOOT-MOUNTED MOTOR

HORIZONTAL VARIDRIVE MOTOR

U.S. ELECTRICAL MOTORS INC.

P.O. Box 2058, Los Angeles, California or Milford, Connecticut



The new 2-Mev X-ray generator and Kodak Industrial X-ray Film, Type AA, will help ACCO step up productivity by 9 times.

New 2-million-volt X-ray generator and Kodak Industrial X-ray Film give ACCO Steel Casting and R-P&C Valve Divisions of American Chain & Cable Company new inspection speed with fine radiographic quality.

Down goes inspection time— Up goes productivity

INDUSTRY TODAY is calling for more and more valves for higher pressures. These must be high-quality steel castings, and sound throughout.

To be sure of this quality, American Chain & Cable Company makes full use of radiography. And now with a 2-Mev generator and radioactive sources, together with Kodak Industrial X-ray Film, Type AA, inspection time has been greatly reduced and higher productivity facilitated.

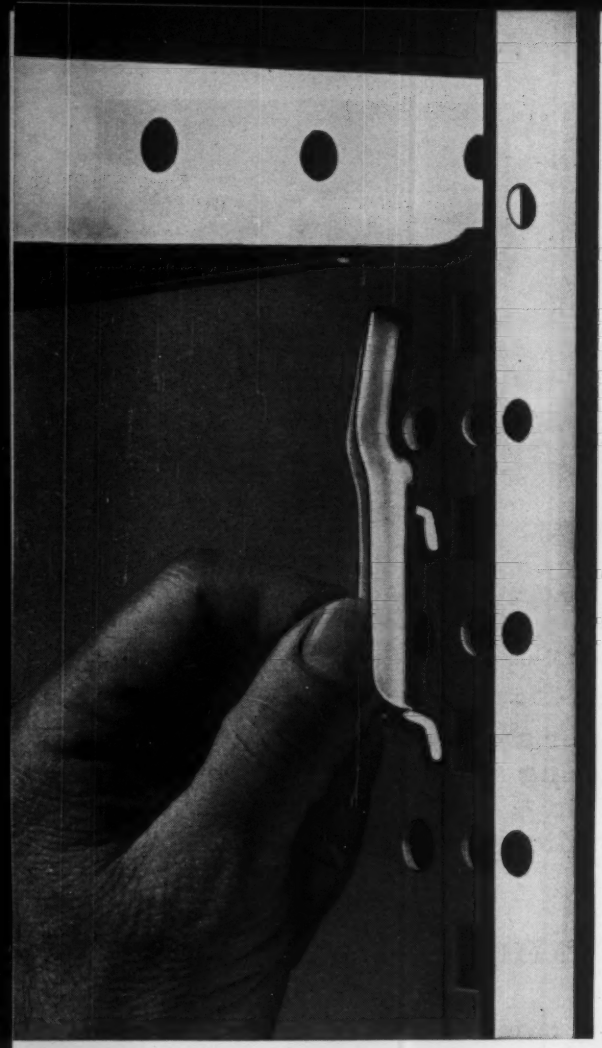
Foundrymen everywhere—in large plants and small—find radiography a big factor in pleasing customers and building business. If you would like to know how it can help you, get in touch with an X-ray dealer or write us for a Kodak Technical Representative to call.

Read what Kodak Industrial X-ray Film, Type AA, does for you:

- Speeds up radiographic examinations.
- Has high film contrast, giving increased detail visibility and easy readability at all energy ranges.
- Provides excellent uniformity.
- Reduces the possibility of pressure desensitization under shop conditions.

EASTMAN KODAK COMPANY
X-ray Division Rochester 4, N. Y.

Kodak
TRADE MARK



NEW FROM REPUBLIC

COMPRESSION SHELF CLIP

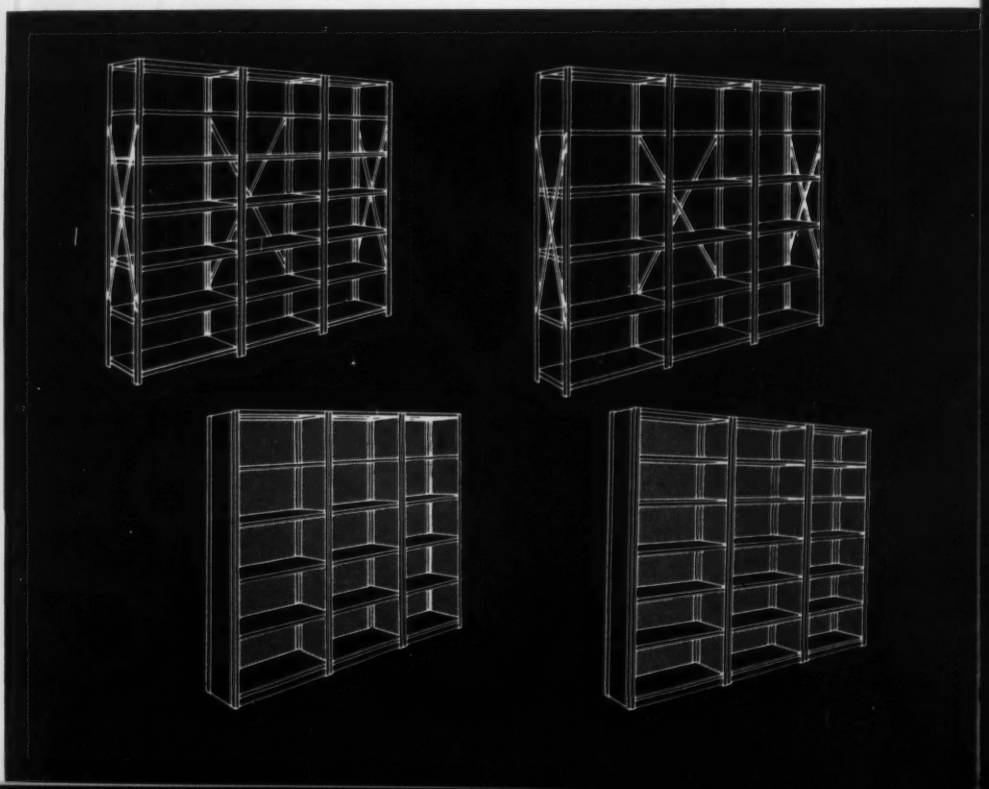
New, Republic Compression Shelf Clip is designed to ease and speed shelving erection.

No tools needed. Clip slips firmly into upright slots. Simply slip clips onto upright—no studs or bolts needed. And Clip Shelving supports heavy loads safely.

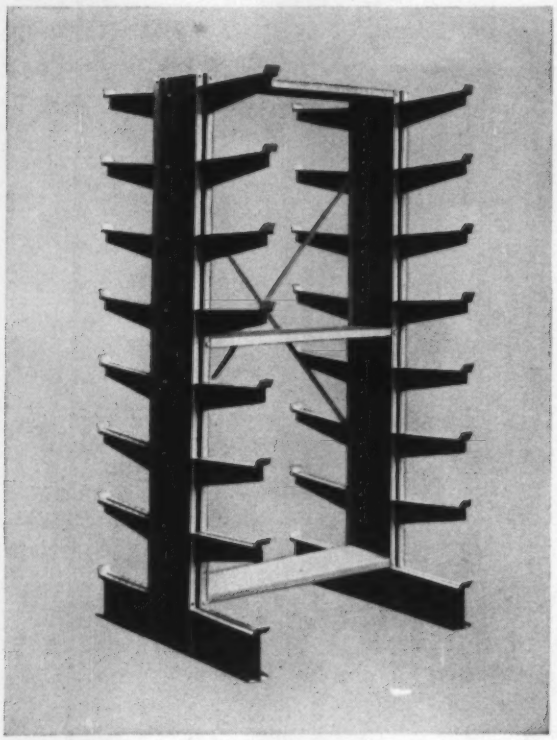
One man can erect any given assembly of Republic Clip Shelving quicker and easier than ever before. Simple shelf rearrangement and long life make Republic Clip Shelving a profitable investment.

Shelves, uprights, and accessories are Bonderized. This extra Republic feature provides a superior base for the baked-on enamel finish and protects against rust and corrosion. Clips are furnished in clear bright cadium for years of rust free service.

To learn about the advantages and economies of this new product, call your Republic representative. Or write for attractive, illustrated catalog.



REPUBLIC CLIP SHELVING Rack Type Units provide storage space for packaged goods, cartoned goods, bulky materials, and other stock not requiring the enclosure of backs and ends. Sway braces add to the rigidity of rack type units. Open and closed, the assemblies shown here are typical of the thousands of combinations possible with Republic Clip Shelving. Write for catalog.



REPUBLIC BAR RACK stacks, stores 14 tons in 36″ space! It is the ideal solution to a practical, economical way to store bars, pipes, rods, any elongated stock. Each arm arrangement permits easy access and stock segregation. Each arm supports 2,000 pounds. Arms adjustable on 2″ centers. Size: 78″ high, 36″wide, 33″ deep at the base. Send for additional information.

REPUBLIC . . . CAN DO IT FOR YOU! Contract manufacturing, with complete sheet steel fabrication facilities, is a full time operation at Republic's Berger Division. Well rounded stock of tools and dies, and a complete machine shop. Modern equipment for shearing, punching, forming, finishing, and painting. Mechanized crating department with conveyor line carton-packaging facilities. And Republic engineers will work with you in developing your product and solving manufacturing, assembly, and delivery problems. Call, or write today.

REPUBLIC STEEL LOCKERS improve employee relations with clean, attractive, dress-wash-and-change facilities. Big, roomy interiors are planned for convenience and good ventilation. Strong and sturdy—made of steel. Complete protection for tools and personals. Bonderized for long service life. And Republic's Berger Division will help you with your locker planning and assume full responsibility for proper installation. Call your Republic-Berger representative, or write.

REPUBLIC STEEL

REPUBLIC STEEL

World's Widest Range

of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. IA-9423
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on the following products:

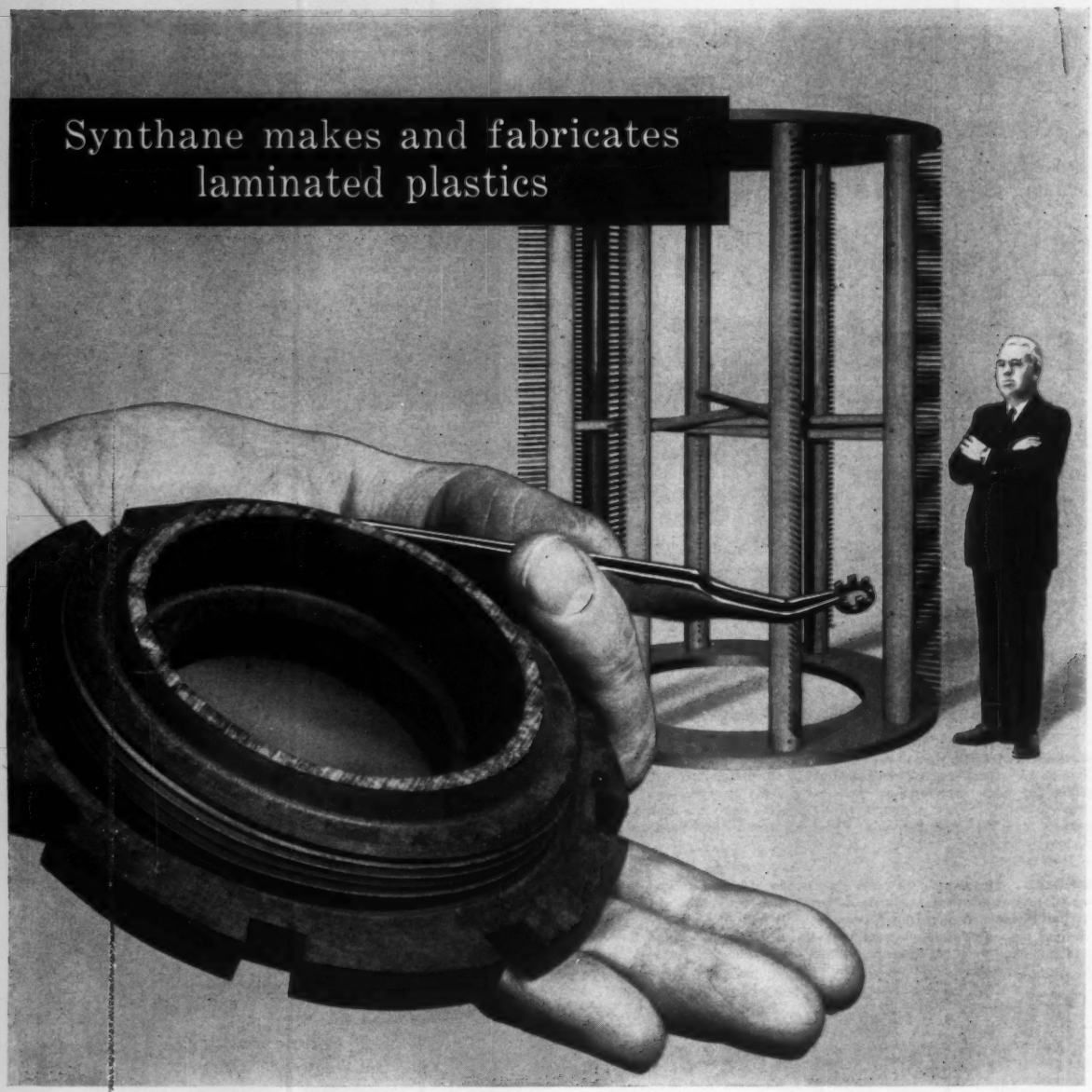
☐ Republic Compression Shelf Clip—Catalog
☐ Republic Bar Rack ☐ Republic Steel Lockers
☐ Republic Contract Facilities ☐ Have an engineer call

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____



Large, small or in between...we make it

Size is no problem in our fabrication of Synthane laminated plastics. Whether the part fits into your palm or onto the head of a pin, or towers over you, we believe we can handle it.

Why? Because we make the material and can control it to suit the job. Our variety of machines and tools, many of them special, permit the widest freedom in the choice of a machining approach. Our skilled people have rolled up over 30 years of experience in doing the difficult and impossible. So, large, small or medium in size, let us take the production worries of your part off your mind.

Call your Synthane representative for a quotation or write Synthane Corp., 56 River Road, Oaks, Pa.

You furnish the print—we'll furnish the part

SYNTHANE
CORPORATION OAKS, PENNA.
Sheets • Rods • Tubes • Fabricated Parts
Molded-laminated • Molded-macerated

NEW FROM NIAGARA

HYDRAULIC PRESS BRAKES

44 MODELS OF SMOOTH-ACTION POWER!

. . . from 200 to 1000 ton capacities . . . up to 24 ft. working lengths

It was bound to happen: the development by Niagara of a companion line of hydraulic press brakes . . . the best obtainable today.

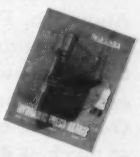
Designed for long stroke work at constant tonnage, these all-new machines complement Niagara's long-established mechanical press brake series. Together, they cover a tremendous range of sizes and capacities . . . *the most complete in the industry!*

As in the development of Niagara's mechanical press brakes, nothing has been spared in designing the hydraulic HD Series. Features like these are the direct result.

- *UNITIZED HYDRAULIC SYSTEM* . . . compact and easily accessible
- *NEW RAM LEVELING AND TILT CONTROL* . . . maintains accuracy *without* complex hydraulic or electronic devices
- *LAMINATED, NON-METALLIC WAYS* . . . prevent welding or galling of bearing surfaces
- *SELF-ALIGNING BALL JOINTS* . . . apply force uniformly to ram without binding
- *DEEP, RIGID BED* . . . interlocked to frame
- *FRONT-OPERATED, LOWER LIMIT RAM ADJUSTMENT* . . . with dial type counter for fast duplication of previous settings
- *ADJUSTABLE TOP AND BOTTOM STROKE STOPS* . . . conveniently located
- *TELL-TALE FILTERS* . . . guardian of the hydraulic system

But this only *begins* to tell the story. For complete facts and figures, request Bulletin 91.

Niagara Machine & Tool Works, General Offices and Works: 683 Northland Avenue, Buffalo 11, N. Y., U.S.A. District Offices and Distributors everywhere.

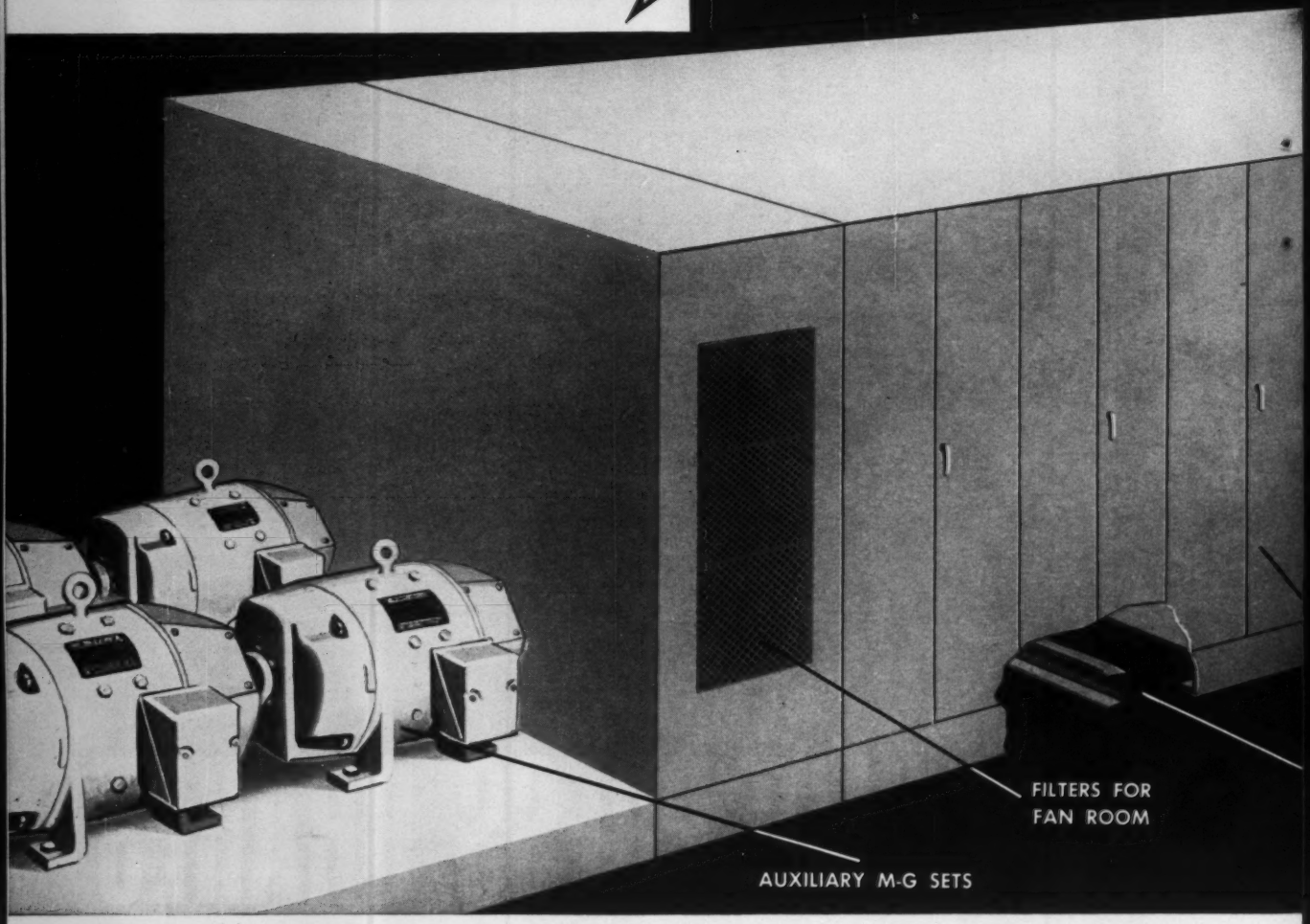


NIAGARA

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

FOR QUALITY... PRODUCTIVITY ... PROFIT

METAL ROLLING AUTOMATED BY GENERAL ELECTRIC



A NEW PRACTICE IN PROCESS-LINE CONTROL

G-E "packaged" motor-control rooms reduce

The latest innovation in modern steel-mill process-line control is General Electric's new "packaged" motor-and-control room. This novel design, developed jointly by General Electric and Jones and Laughlin Steel Corp., groups all controls and m-g sets into one compact centralized unit. The above unit will be installed at J&L's Aliquippa, Pa., works, as part of their continuing facilities-improvement program. Previously, the installation expense on this equipment often matched or exceeded the actual cost of the equipment. The new G-E motor-control room design cuts installation costs as much as 40 percent!

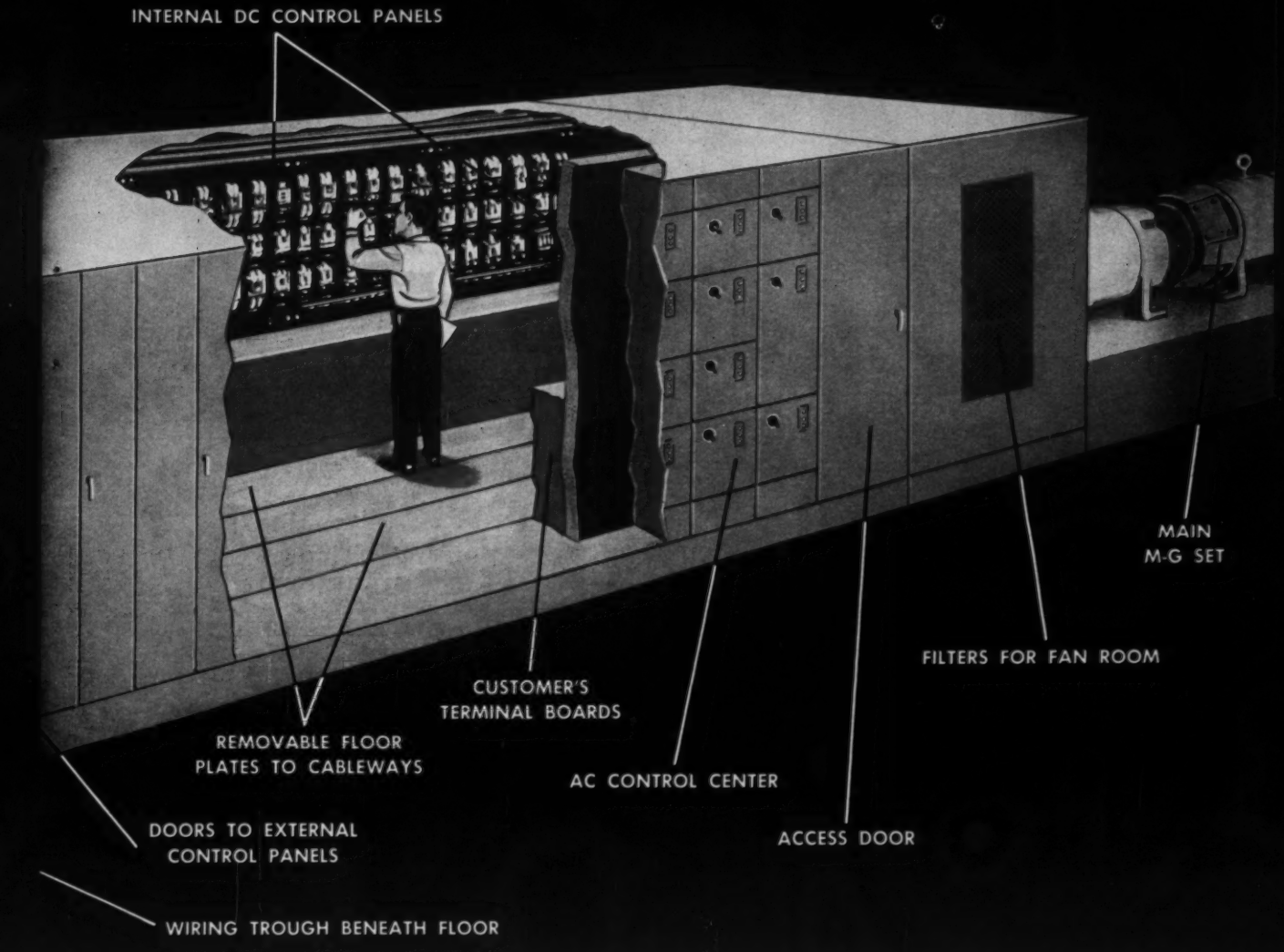
HERE'S WHY INSTALLATION COSTS ARE LOWER

Substantial savings on installation expenses can be realized through these features:

Independent control unit—The General Electric motor-control room is a completely co-ordinated, pre-assembled unit in itself, and in many cases, eliminates the need for a separate motor room. Since the motor-control room is self-contained, it may be located either near the driven equipment or in some previously unused area of the mill.

Field wiring is reduced by one-third or more—All internal connections are made and tested before the motor-control rooms are shipped. The only field wiring required is the connection of the power source and the leads to the operators' stations and the drive motors.

Construction engineering costs reduced—General Electric's grouped control concept enables the mill to know its conduit requirements much sooner. Thus, fewer,



installation costs as much as 40 percent!

less-complex construction diagrams are needed, and actual construction can begin at an earlier date.

Common base minimizes installation time—This new "packaged" motor-control room, delivered on its own self-supporting platform, can be immediately set on a normal mill floor. It does not require expensive, specially-constructed foundations. With m-g sets built and shipped on a common base, the need to align them at the mill site is eliminated. In addition, regulating equipment is factory-tested prior to shipment, further expediting startup time.

For all the details on this new technique in process-line control, contact your G-E Sales Engineer today! General Electric Company, Industry Control Department, Salem, Virginia, and Direct Current Motor and Generator Department, Erie, Pennsylvania. 785-7

Progress Is Our Most Important Product

GENERAL ELECTRIC

METALGRAMS

UNION CARBIDE METALS

. . . news about "Electromet" ferroalloys and metals

MAY, 1960

NEW EXOTHERMIC CHROMIUM SAVINGS -- Open-hearth melters using an exothermic ferrochrome ladle practice can save from 50 to 60 cents per ton by using new "Chromtemp" ferrochrome 25-6. The silicon content of the alloy (6.25 lbs. per can) saves the steelmaker money by replacing separate ferrosilicon additions required with straight chromium exothermic alloys. Your Union Carbide Metals representative will be glad to give you further information.

* * *

EXOTHERMIC WITH MORE HEAT -- Closer control of large open-hearth ladle additions can now be obtained with the greater exothermicity of "Chromtemp" exothermic ferrochrome and "Mantemp" exothermic ferromanganese. The improved reaction promotes greater stirring, minimizes segregation, and dissolves the alloy faster. The result is better control of alloy analyses, resulting in fewer off-grade heats. Specification sheets for these alloys may be obtained by requesting F-20,124 and F-20,125.

* * *

LESS GAS THAN EVER -- Producers of vacuum-melted steels and high-temperature alloys have improved their melting operations with new "Elchrome" VG electrolytic chromium. Having less than 0.06 per cent oxygen and extremely low hydrogen and nitrogen contents, this high-purity vacuum-grade chromium has the lowest gas content commercially available. As a result, it's easier to maintain a vacuum and there's less spattering and boiling in the bath. Ask your Union Carbide Metals representative for the analysis of this improved chromium metal.

* * *

EYES ON PHILADELPHIA -- Foundrymen interested in the latest uses of ferroalloys to produce better castings will want to visit Union Carbide Metals' extensive exhibit at the 64th AFS Castings Congress and Exposition, May 9-13, in Philadelphia. The Union Carbide Metals' exhibit covers 41 foundry alloys. Featured are alloys that give better properties to cast iron, allow more efficient production of ductile iron, cut costs of steel, and give greater purity to aluminum. Experienced UCM metallurgists and engineers will be on hand to provide on-the-spot assistance. You are cordially invited to visit the exhibit and talk to UCM personnel. See us at booth No. 1214.

* * *

GASES ARE FLUSHED OUT -- A new alloy -- magnesium-calcium-silicon -- has been used successfully to flush out gases in high-alloy heats melted in the induction furnace. The alloy is added to the ladle and produces a vigorous flushing action. One producer reduced his rejection rate caused by gas imperfections from 30 to 5 per cent on a 35 per cent nickel, 15 per cent chromium casting. For the case history, write for the article, "Rejections Cut With New Alloy," in the Winter 1960 issue of UNION CARBIDE METALS REVIEW or contact your UCM representative for further details.

* * *

UNION CARBIDE METALS COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.

"Chromtemp," "Elchrome," "Electromet," "Mantemp," and "Union Carbide" are trade marks of Union Carbide Corporation.

TOTAL CONTRACTS FOR CONSTRUCTION are expected to, "amount to $35.9 billion, down only 1 pct from the record levels of 1959," says Dr. G. C. Smith, vice president of the F. W. Dodge Corp. He reports the only "relatively weak" factor--housing--is already at or near the bottom of its decline. (P. 101)

JAPANESE ARE NOW OFFERING COMPLETE COMPONENTS to manufacturers of U. S. metalworking products. Latest entry is in the automotive field, where Japanese sales agents are offering clutch parts to producers of automotive components.

MARKET RESEARCHERS SHOULD LEARN OF PRODUCT "LIFE SPANS," says Michigan U. professor, Donald R. G. Cowan. The consumption factor, or "life span," says the professor, is often overlooked in developing sales estimates. Studies of life expectancies of some consumer goods show: Refrigerators, 15 years; ranges, 15 years; washing machines, 9 years; television sets, 9 years.

COMMERCE DEPT. IS MOVING SWIFTLY to get the new export program into action. Experienced businessmen will work with the Dept.'s 33 field offices putting trade information to the best and quickest use, and developing more trade leads. In two overseas areas, intensive "pilot plant" efforts will be made to test potential of an all-out trade promotion effort. (P. 115)

PURCHASING MEN SEE NO NEED TO BUILD UP INVENTORIES beyond immediate forseeable requirements. The April Business Survey Committee of the National Association of Purchasing Agents gives two reasons for this buyer attitude: Availability of material, and strong competition.

COMPACT CARS RISE HITS AUTO PARTS INDUSTRY, according to one report. Smaller and fewer parts needed by compacts has hurt sales.

GOOD OVERSEAS CUSTOMER FOR MACHINERY is Renault of France. This company regularly places large orders with 12 major U.S. firms, and also places small orders with another 40 to 50 U. S. manufacturers. In 1959 its dollar volume of U. S. orders was $3,003,755.

CAR MAKING SCHEDULES ARE RISING, following encouraging April sales. May programs call for 615,000 cars compared to 583,000 in April. May schedule is best total for the month since record 1955.

here is a "part-making" *REVOLUTION!*

★ 75% saving in tool cost

★ 33⅓% saving in material

★ 25% production increase

BUMPER
PART SIZE:
106 inches long
4¼ inches wide

MATERIAL:
NAX-TYPE STEEL
Modified For Bumpers

New, Radial Draw Forming Machines with *HIGH SPEED* production are opening broad horizons in forming metal parts. Greatly increased freedom in part design . . . plus unparalleled production economies are now obtainable with this new process. For the company with vision and foresight to go beyond old fashioned fabrication methods . . . the potential is unlimited.

Parts requiring single or compound curves, constant or varying radii can be formed by The Cyril Bath Special Products Division . . . or we can design and build a machine for you to effect major production economies. Write, wire or phone for literature . . .

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Construction Outlook Is Good; How Good Is the Question

After a slow start, the construction industry is showing signs of a pickup.

Prospects for the rest of the year are good. Even home building could turn out to be pretty good.—By K. W. Bennett.

■ It's been a long winter for the construction industry, but the end is finally in sight. Gains scored in March construction business — in the face of tight money, bad weather, and low profits—continued in April.

An upturn in construction is worth watching. Construction industry and its suppliers injected a record $36.3 billion into the economy last year, bought 25 pct of steel output, 25 pct of aluminum output.

Watch Second Half — They'll spend almost as much in 1960. And they'll concentrate a much heavier portion of dollar spending in the second half of 1960 than they did in the second half of last year.

"Prospects for the construction industry during the remainder of this year are excellent. We expect total construction contracts in 1960 will amount to $35.9 billion, down only 1 pct from the record levels of 1959," says Dr. G. C. Smith, vice president and chief economist for the F. W. Dodge Corp.

"In fact, the only relatively weak factor in this year's construction picture, namely, housing, is already at or near the bottom of its decline. And by mid-year, it may well be in a rising trend once again," he notes.

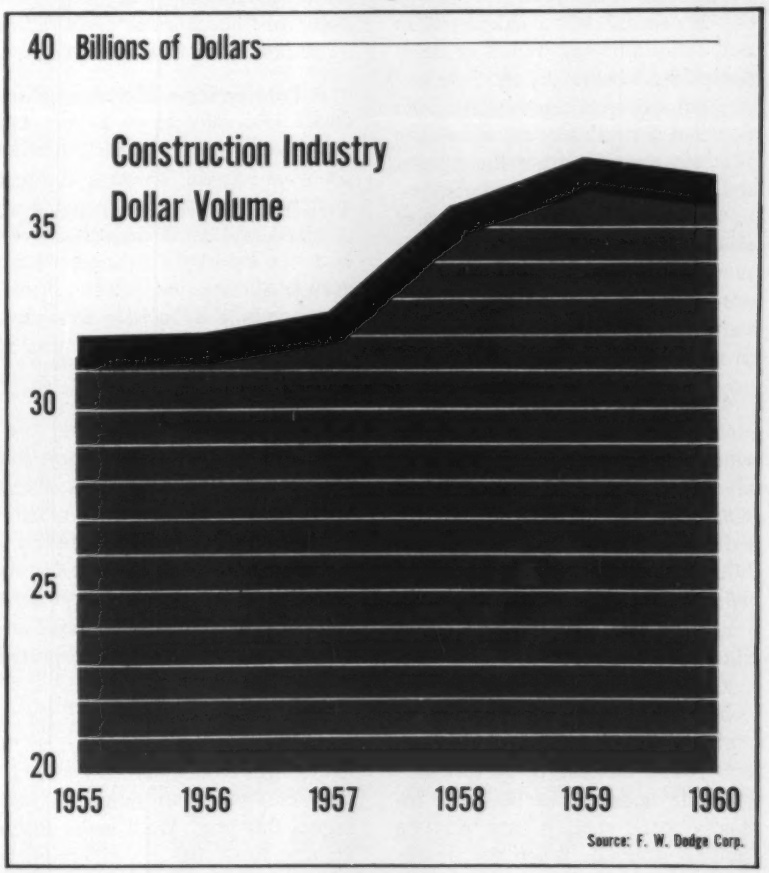
Structural Pick-Up — The construction industry economist predicts that, "For the year as a whole, residential construction contracts are likely to total $1.58 billion, down 8 pct from last year. Contracts for non-residential building should continue fairly strong, reaching a total of $1.22 million, up 7 pct from1959."

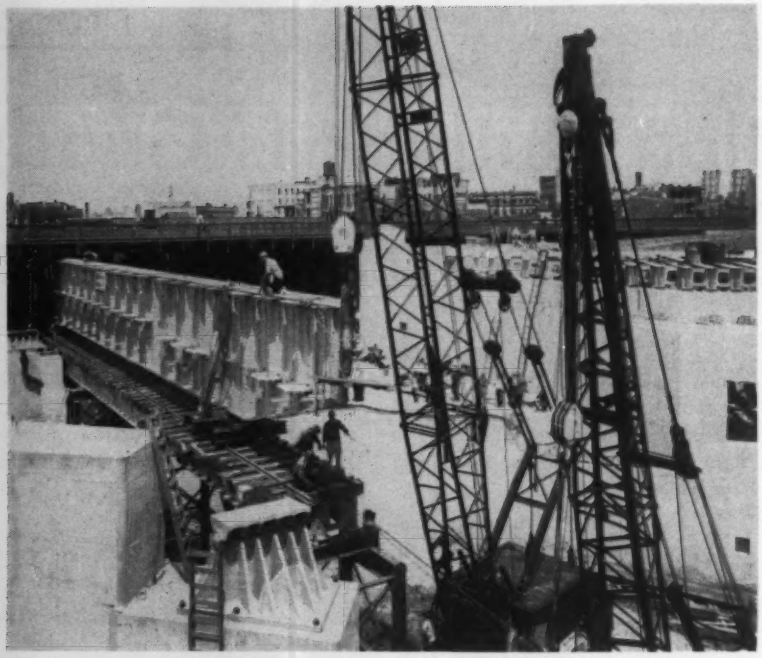
Dr. Smith also points out that heavy engineering contracts will provide strength, rising to $7.9 billion, or up 2 pct from last year.

First real strength comes from the structural fabricators. Heavy structurals represent 5 to 8 pct of annual steel output. Midwest fabricators last week confirmed that April bookings averaged 50 pct above March. April heavy construction outlays were up 25 pct over March, according to reports, to a record $2 billion for the month.

Out of Doldrums—A. J. Paddock, president, American Bridge Div., U. S. Steel Corp., told The IRON AGE that 1960 bookings are already 10 pct over 1959 levels. And this could increase to 15 pct

Construction Dips From Record





TIGHT SQUEEZE: With just 2 in. to spare this 126 ft long girder is squeezed through an underpass prior to being lifted into place as part of an overpass for Chicago's new Northwest Expressway.

by the end of the year.

"Of course," Mr. Paddock points out, "this will still represent sales some 25 pct below the 1955-56 levels, but we are encouraged by the fact that our industry seems to have begun a recovery from the market doldrums of the past two years.

"From the accelerating amount of newly announced private projects now entering the planning stage, we are confident that the construction industry will see continuing improvement in the season ahead."

Upturn for Housing? — Equally strong gains are anticipated by the aluminum industry. Construction of all types used 1.25 billion lb of aluminum last year. The industry expects the 1960 figure to hit 1.4 billion lb. This represents a 12 pct gain. It also suggests that construction will again take about 25 pct of aluminum output.

Chief sources of strength for the construction gains are commercial and industrial building, highway, and public building construction.

While housing has been the industry weak spot, it may now be gaining strength. When the figures are in, government sources now expect April housing starts will reflect a substantial increase over March.

A Late Spring—The seasonal increase is usually 15 to 20 pct, but April starts may have hit 25 to 30 pct over March. Through the first quarter, new homes were going up at a rate of 1.1 million units. However, the industry's forecasters have been predicting that 1.2 to 1.3 million homes will be built this year. Last year, housing starts totaled 1.38 million, second only to 1950's 1.4 million.

Chief reasons for the strong forecast: Bad weather, tight money, and stiff competition held back home starts through the first three months of the year. Building industry spokesmen insist all of these factors will ease as the summer progresses; and the government's next announcement on housing is expected to bear this out.

Says the sales executive for a major firm in the home market: "I figure tight money and bad weather have cost us up to about 100,000 homes this year. We'll never make up that loss." But he still predicts 1.2 million homes will be built in the U. S.

Big Users—The value of housing as a market for aluminum isn't lost on that industry. Construction of new homes and renovation of older homes took 600 million lb of aluminum in 1959, up from 480 million lb in 1958. And it is expected to rise to 750 million lb this year. New home construction alone will require about 265 million lb this year, compared with 200 million lb last year.

And non-residential construction uses nearly as much aluminum as new home construction and renovation combined.

Record Year—Says A. H. Williams, general manager, Architectural and Building Products Markets, and vice president of Reynolds Aluminum Sales Co.: "From all indications that we have, 1960 will be an excellent year for construction of all kinds. The new housing legislation by Congress should help lagging residential construction during the latter half of the year.

"As for aluminum construction, sales and activity thus far indicate that this will be another record year with building uses expected to total 700,000 tons. The year will find aluminum appearing in new applications. New landmarks will be reached in progress toward panellization and modular construction using aluminum."

Pre-Fab Sales — Another cause for occasional bursts of surprising optimism in the home markets: Prefab homes are moving strongly into the general housing market. Harry Black, general manager of sales for U. S. Steel Homes, announced a 500 home subdivision at Chicago last week. At the same time, he indicated that his group will double its 1959 home output.

National Homes, biggest of the prefabricated house builders, is more conservative in appraising the home building market. But it still expects to get a larger share of the market this year.

J. R. Price, National's chairman of the board, says: "A drop of 15 pct in housing starts wouldn't be un-

expected. We do not anticipate that our own reduction in sales will be anywhere near as great. We expect our sales will be within 10 pct of 1959 levels."

Caution Light—Some larger fabricators say they've booked less business in April than in March. Smaller fabricators are offering 60 to 90 day delivery, occasionally even less.

Big fabricators don't feel they can compete with such short delivery times. However, they have six month backlogs already and are up to last spring's backlog levels.

Common Complaint—The more common complaint, through the entire construction industry, is that 1960 is proving the year of the hard sell. Profit margins are low.

And this problem ranges from producers of heavy earthmoving equipment down to small contractors who purchase their bulldozers and shovels. One earthmoving equipment maker finished a record first quarter in unit sales, but is running well under last year from a profit standpoint.

Homebuilders voice the same complaint. They can sell homes, but they're working far harder than last year to come within even 90 pct of last year's business levels. Easing credit should dissolve some buyer resistance, they feel, but are still hedging their forecasts on the total 1960 outlook.

Good Market—As a metalworking market, construction men say they are a good prospect for 1960. But they'll move more of their buying into second half than is usually the case. One large fabricator, for example, is reducing inventory in second quarter, will buy more steel in second half than in first, and his total 1960 purchases will exceed 1959 buying levels.

A producer of earthmoving equipment is cutting his second quarter buying by 20 pct (all materials and components). But the company will bounce back 25 pct over second quarter in third quarter. He's also talking, though guardedly, of doing a record business in 1960.

Tool Users Demand Standardization

Machine tool builders get the word from user panel at spring meeting.

Failure to standardize impedes production and raises costs, panel says.

■ Standardization of general-type machine tools took a step forward at the National Machine Tool Builders spring meeting.

A panel group at the New York session put forward a detailed list of dimensions its members feel should be uniform. Chairman of the user group, R. L. Witsche of International Harvester Co., said they spoke for 56 companies in automotive, farm machinery, electrical equipment, business machine industries, and the Dept. of Defense.

Flexibility Needed—Mr. Witsche stated that the demand for standardization is to make it possible to move tooling and accessories freely from one machine to another.

This is barred at present by a difference of as little as a sixteenth of an inch in a table keyway or other dimension, he said.

Builders Reaction — This proposal for unified dimensions on equivalent tools was offered to a small group of representative machine builders in Detroit, March 22nd.

When offered to the full group of builders in New York, reaction was mixed. No questions or comments were volunteered after the formal presentation. Some machine tool executives, however, privately questioned whether standards might restrict the design and engineering of future machines. Others asked if this meant that all milling machines of one size would eventually have to be identical, as in the Soviet Union. Others took exception to mention of greater standardization found in foreign machines.

Instead of making American tools more saleable, one wondered if the move might not open the door wider to foreign competition. With American standards in hand, foreign builders could more readily design for the U. S. market.

No Action Taken — On the whole, however, many present agreed that the general goals cited are desirable. The users' group asked for appointment of a single representative of the association to begin a study of the program immediately and appointment of group representatives by June 1. However, no formal action was taken by the association.

Reason for the standardization push at this time stems from two sources. One is the rapid advance of weapons systems and defense needs. Production experts from the Pentagon now say there's no longer any extended lag possible in tooling up, either under current conditions or under forced defense mobilization.

Standard machines available in metalworking plants would allow a quick switch of tooling from one area or plant to another. Often in past emergencies, plants had to retool to get back into production of military hardware.

How Variations Hurt—Industry panel members said that downtime is ballooning because metalwerking plants now are unable to switch production from one general purpose machine to another similar one because of variations in some of these critical dimensions.

Spokesman for the Defense Dept., Col. E. T. Wiley, Jr., told the machine tool builders that the ability of the industry to voluntarily improve production efficiency by standardization is of great interest and importance to the Department.

Congress Probes Hot Metal Sales

Aluminum Makers Deny Price Favoritism

Hearings into alleged hot metal deals between primary aluminum producers and foundry customers are underway.

Alcoa, Kaiser, and Reynolds deny charges of price squeeze on independent smelters. — By R. W. Crosby.

■ Charges of unfair competition and price squeezing in the nation's aluminum industry are under investigation by Congress.

Hearings before a House Small Business Subcommittee, headed by Rep. Sidney Yates, (D-Ill.) are looking into these alleged abuses:

(1) So-called hot metal deals between the Big Three primary producers — Alcoa, Kaiser, and Reynolds—and some of their customers. (In hot metal sales, the producer delivers molten metal directly to foundry customers.)

(2) Unrestricted export of scrap aluminum. (Independent smelters point out their industry is dependent on scrap as a source of raw material.) Despite a large increase in exports, they say, the U. S. Dept. of Commerce hasn't used its powers to limit shipments abroad.

Charges Denied — At the hearings, spokesmen for the Big Three outlined their molten metal activities for the Committee and discounted charges of preferential deals with customers. They acknowledged that a price problem exists in the industry, but said it is caused by the small independent fabricators.

But independent, nonintegrated smelters, diecasters and extruders complained that primary company hot metal contracts are hurting their business. Preferential treatment given customers by the primary aluminum producers, they charged, was unfair competition.

The American Die Casting Institute told the Yates Committee that the primary producers were taking away the hot metal contracts of small diecasters.

"Open and Above Board"— Representatives from "customer" companies, such as General Motors, Chrysler, and Ford, testified that their purchases of molten metal were open and above board.

Sherrod E. Skinner, GM executive vice president, said the average use of aluminum may double by 1965. He predicted that small aluminum fabricators will share in the growth as much as the big companies.

Leonard Starr, of the Aluminum Extruders Council, charged the Big Three with granting free warehousing, and discriminatory advertising and financing to customers such as large automotive companies.

Price Discrimination?—Carl H. Burton of The Aluminum Smelters Research Institute, urged investigation of the possibility that preferential discounts on hot metal sales were in violation of the Robinson-Patman Act, which prohibits price discrimination.

In respect to hot metal deals he pointed out the Committee heard testimony two years ago indicating aluminum producers appeared to be extending preferential discounts to molten metal buyers.

"The aluminum smelting industry has never opposed hot metal deals as such," he said. "In fact, we welcome them, as we would welcome any other contributor to the rapid increase in aluminum consumption

PRODUCER'S VIEW: Testifying before House Small Business Subcommittee headed by Rep. Sidney Yates (left), Joseph H. McConnell, executive vice president and general counsel, Reynolds Metal Co., labeled price discrimination charges "completely false."

which will eventually come to the market as scrap."

Share for All — Representatives of the Big Three were unanimous in agreeing that small firms would share in aluminum's growth.

Lewis P. Favorite, vice president of Alcoa, said small business firms "can expect a glowing future in the aluminum industry (and) can enter or expand into different kinds of fabricating and processing operations without hindrance."

SHERROD E. SKINNER: Small fabricators will share aluminum's growth, General Motors executive vice president testified.

Mr. Favorite said his company has entered the molten metal field because it was the only way to participate in bidding for the business of the automotive industry. Molten metal, he said, was a customer requirement in the bidding.

Reynolds Testimony—Joseph H. McConnell, of Reynolds Metals Co., told the Yates Committee that the price levels are determined by the independent extruders.

He labeled as "completely false" the charge that the Big Three were trying to force the independent extruders out of business.

He testified, too, that Reynolds has made no extensions of molten metal contracts since 1957.

Computers Tackle Bigger Data Job

RCA seminar highlights coming role of electronic data handling.

High interest shown by metalworking men in getting better management control through use of computers.

▪ Electronic data processing is heading towards the "total system" concept. All signs point to "mother" computers linked with smaller units in branch plants. These will process data ranging from payroll computation to machine loading.

This was the direction sensed by 50 plant and production executives attending a 3-day seminar hosted last week by RCA at its Cherry Hill, N. J. plant. The executives were from both industry and government. Over one-third of the group were from metalworking companies.

Seminar Plan—Basic idea was to show the RCA electronic equipment line in operation and to thrash out mutual problems in data processing.

Most of the executive guests reported good success with their computer applications and an interest to go further along the road to electronic handling of data. "Partial mechanization is a help," said one, "But it's like building a super-highway leading into smaller roads. There gets to be a clog when the traffic hits the smaller roads."

Management Control—John E. Johnson, vice president, marketing, for RCA's EDP division, cited "need for management control" as the chief impetus behind electronic data handling. Mr. Johnson pointed out that factory automation has far outstripped office automation, and that the control of these faster, more complex production operations calls for even greater management control.

Said the RCA executive, "Today, there are many examples of automatic factories, but there isn't even one example of an automatic office."

Need Urgent—Management controls are now more urgently needed than ever, said Mr. Johnson, and management has seen that the addition of more office workers to keep records and compile reports has not been the answer.

"In the past 50 years," he said, "industrial production in the U. S. has increased by more than 600 pct. During the same period, the number of factory workers increased only 80 pct. While factory workers increased by this 80 pct, office workers increased by nearly 450 pct."

Pointing to RCA's own success with its evolving "total system" approach to EDP, vice president, management engineering, Fred R. Raach stated the company was "on target" in their ambitious goals.

Application—"Immediate goals call for increasing the inventory turns from 7 to 12 per year," he said. "In terms of dollars, this means reducing the in-process inventory from an average of $21 million to $12 million, a reduction in capital required for the operation of $9 million. In addition, costs of carrying the $9 million, such as interest, insurance, taxes, a total of about $1,250,000 will be eliminated."

Inventory Control — Inventory management was a high-interest subject of the visting executives. In a rapid-fire round-table session on the subject the experts stated the need for better sales forecasts to aid in buying and scheduling.

Army Wants Simplicity, Mobility

One Apparent Result: A Brisk Battle of Materials

Steel and aluminum are going at it competitively for Army's vehicle markets.

Big need of the Army is simplicity of construction and operation of the complex tools of war.—By Tom Campbell.

■ President Eisenhower gave the Army its biggest shot in the arm in recent years. Last week he unexpectedly attended — with pleasure and enthusiasm—the Army's Project MAN at Ft. Benning, Ga.

The morale effect of this visit during a period when massive and world shattering global decisions are being made was not lost on the Army, the industrialists or communications people at the show. Coming at a time when the U. S. Army is fighting for its fiscal, and probably its physical life, the gesture by its Commander-in-Chief put some of the pieces back together again.

Battle of Materials—Behind the scenes another battle is brewing. Signs of it were apparent at the Project MAN (Modern Army Needs). This fight is becoming more aggressive than that being waged by Army generals attempting to protect the service from becoming a defense stepchild.

Steel and aluminum are locked in a battle which, as time goes on, will remove all the lead—if any—from the anatomy of the men in both camps. Last week the aluminum fellows were out in full array standing beside their unpainted aluminum personnel carrier on display. This effect was the same as the well known sore thumb in everyday life.

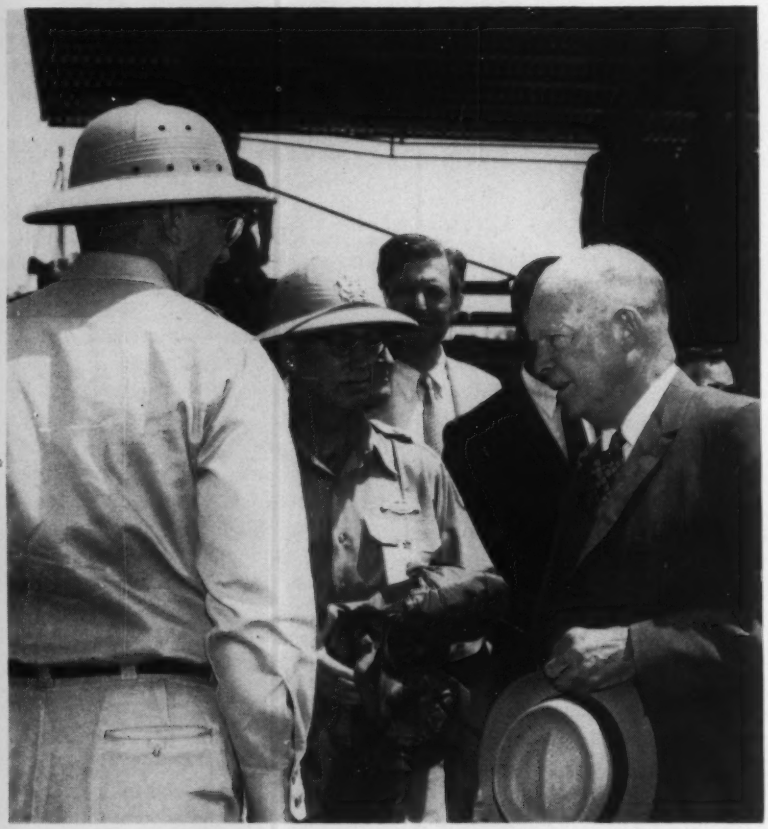
The General Speaks—But outspoken Lt. Gen. A. G. Trudeau, chief of research and development, gave a few hints as to which way the procurement and development wind is blowing. He indicates that mobility, strength, and simplicity are the factors which the Army requires.

General Trudeau's biggest impact came when he challenged the industry people to suggest changes, make changes, and aim towards cheaper, better and less complicated handling of complex machinery, systems and products. This plea met with mixed reactions.

Industry Reaction—Careful to be off-the-record, many industrialists indicated they believe the Army (and other services too) want everything for nothing. Their idea is that vast amounts of money have to be spent for research and development that should be paid for by the Army.

But that group was countered by another no less vocal bunch which believes that all the trials and tribulations faced by the contract agent and the contract officer are the ways of life. Their pitch was that Johnny-come-latelies were the ones who felt the adverse impact of the test, change, fight, "check" and pay procedure of some Army contract officers.

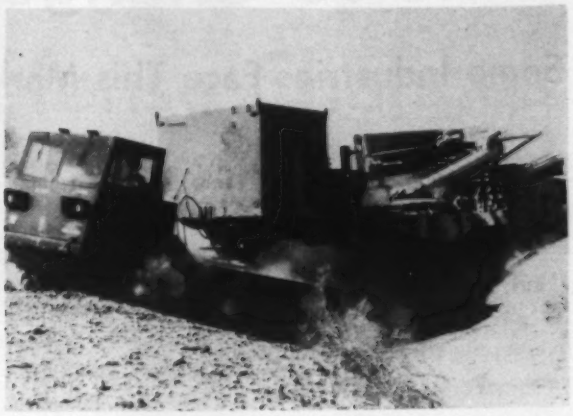
One top executive said: "I don't agree with some of the suspicions of



MORALE BUILDER: Ike's surprise visit to Project MAN boosted morale of Army at a time when it needed a boost to its prestige.

Army Shows Off a Pair of Heavyweight Lightweights

SAND AND SEA: A new land-sea vehicle, the LARC-5, features an easy-access cargo deck. Fabricated of aluminum, it was developed and produced by the Ingersoll Kalamazoo Div. of Borg-Warner Corp.



TOUGH LIGHTWEIGHT: Erector - launcher for Sergeant can take rugged field abuse, yet is light enough to be air-transported. Structural members are made of U. S. Steel Corp.'s "T-1" alloy steel.

many contract officers. But I can see that they have been soured by actions of some industrialists who have taken them for a ride." Of course, those contractors who have stayed with the Army have had things a little better than those who supply other services. There have been less cutbacks, changes and eliminations in the Army defense programs than have occured elsewhere.

How Much Patriotism?—It is a sure thing that those who are only breaking into the Army's procurement and development have a lot to learn. Almost overcome by Ike's unusual visit, Secretary of the Army W. F. Brucker made it pretty plain that the Army expects patriotism to play some part in any relations industry has with the Army. Some people may dismiss this as mere banquet circuit talking. But that would be dangerous for the simple reason that most of the Army, from top brass to the private, believes the same thing.

Secretary Brucker admitted that "we don't have the money" we need. He pleaded with industry to find means, time and money to reach the goals of simplicity, mobility, progress and efficiency. Call it competition, patriotism or whatever you like, companies serving the Army are doing a good job.

Steel vs. Aluminum—In the case of the aluminum personnel carrier and other items, weight has been publicly stressed. But Reynolds Metals Co.'s vice-president Clarence Manning will tell you all about safety, price, use in the Arctic, and a hundred and one other strong points of his pet—aluminum. General Trudeau had said that the welded - aluminum, armor - plated personnel carrier is about half as heavy as the older steel version. This points up his argument that weight and mobility were the top characteristics the Army is seeking.

The net effect of the steel-aluminum battle will be good for everyone: steel, aluminum, the Army, and the taxpayer. There is a certain challenge in engineering and "imagineering" for the Army's future.

To say that industrialists look for the profit deal first is not true. Of course, they can't take the orders at a loss. But the big-time money makers—if there ever were any—aren't in the picture. It costs money and plenty of it to make the grade on the Army contracts. Out of this often comes disillusionment, frustration and a "never again" attitude. But this doesn't apply to the tough babies who know their way around — either because they learned the hard way or were lucky to be born with savvy.

Says Charlie Lee, president of U. S. Steel's Consolidated Western Div., "It isn't as easy as falling off a log. And when you ring the bell, it does give you a feeling of accomplishment—and a yearning to come back for more."

Search for Simplicity—Probably the thing the generals and the R & D staffs are looking to industry for —aside from ever cheaper prices— is a simplicity of operation for more and more highly complex equipment and projects. One genial general agreed that the Russians appear to have the knack of setting things up so the ordinary soldier can move, operate and handle the most complex equipment without having to know anything about the whys, wherefores or what-about-its.

As to what the Army has done with tanks, personnel carriers, artillery pieces, helicopters, proper use of men and organization—there is no doubt about it. Those who have accepted the rumor that the Army is washed up have a few more thoughts coming.

Time to Change Sales Policies?

Some Industries Face This Marketing Dilemma

Steel mills know they're in for a period of all-out sales competition.

But they aren't sure whether its part of a cycle, or if the oversupply situation will last for years—By G. J. McManus.

▪ Deploying rapidly for all-out competition, steel mills are wondering if they face a new kind of sales situation with a need for new sales policies.

This speculation breaks down into three questions:

1. How tough is it going to be to sell steel in coming months?
2. How long will it stay tough?
3. How far should mills go in meeting demands of customers for services?

Hard Sell—All agree there is going to be hard selling. "We face a very tough, competitive period," says W. B. Pierce, sales vice president, Allegheny Ludlum Steel Corp.

Mr. Pierce and many others say there is nothing unique in this prospect. They point out the industry has faced buyers markets in the past; many lines have had excess capacity in most recent years.

However, some steel men go a little further in describing the current market outlook. "Steel faces the most competitive period in the past 20 years," says one mill executive.

Sustained Competition — Others say there is a difference of duration as well as intensity.

"There has been competition in other postwar periods," says a specialty producer. "But there has never been the same assurance of sustained competition."

The same point is being argued at a big pipe mill. "Our top people are divided as to whether this thing is just part of another cycle or whether we can look for years of oversupply."

Finally, there is the thought that steel and most industry face a completely different kind of supply situation.

End of an Era—"For the past 20 years, you have generally had a backlog of need," says one steelmaker. "Today, we're in a period where sales depend on needs generated from day to day."

According to this line, the era of heavy inventories, big backlogs and long lead times has ended. Mills will have to react with greater speed and flexibility in a world of short term needs.

"We're preaching to our mills—'the customer is the boss.' The idea of rolling for tonnage bonuses is gone. If we have to change rolls to get an order, we'll change rolls."

Selling Service—Mills are going further than ever before in some lines.—"Our inventories are at an all-time high," says a specialty producer. "But they'll have to get bigger."

However, most service measures are along conventional lines. Only where products are highly standardized or covered by special price structures are finished stocks being carried by mills.

In tubular products, the more standardized types are being stocked. U. S. Steel's National Tube

Problems Aren't New to All

The marketing problems facing steel producers aren't entirely new. Tool steel producers have been living with them for years. Tool steel sales hit a peak of 140,000 tons in 1951; it hasn't come close since. And the industry has a gross overcapacity, according to M. J. Day, vice president–commercial, Crucible Steel Co. of America.

As the country's largest producers of tool steels, Crucible's problems have been complicated by product variety. The company supplies over 18,000 different items.

Since 1957, Crucible has been pinpointing profits by item and order. A daily report gives product managers the gross profit percent for each order. These reports are based on standard costs.

In addition, low profit items are singled out for detailed analysis. In these studies, actual costs are used. Information on low profit items reaches the works manager and the product manager about three weeks after shipment.

In some cases Crucible has corrected cost bulges by changing the manufacturing and marketing techniques.

"When a product can't be made with a proper profit," says Mr. Day, "realism demands that it be discontinued."

However, Mr. Day feels there must be some flexibility to profit standards; selective selling must be avoided.

"In order to give proper service to our customers, we have to take some of the bitter with the sweet." He also points out that too large a profit margin is an evil.

"It simply promotes price cutting; it increases vulnerability to foreign competition; and it restricts the growth of the market."

Div. is operating five downriver depots for oil country seamless. Pittsburgh Steel Co. is putting over $4 million into downriver stocks.

Draw No Line — On standard pipe, producers are supplying an estimated 65 pct of all orders out of mill stocks. About 95 pct of miscellaneous linepipe orders are filled out of stock. Project linepipe, on the other hand, is rolled to order.

In specialty lines, the price structure and other considerations tend to reduce the distinction between mill service and warehouse service.

"We don't draw any line between mill and warehouse quantities," says a stainless producer. "We like large orders but we won't turn up our nose at an order for 100 lbs."

Building Mill Stocks — After a brief boom, specialty mills have moved rapidly to put themselves in a position to handle a wide range of orders. One company offers overnight delivery of stock grades, three to four week delivery on most orders that require processing.

Producers of tonnage steels are taking the normal steps for a competitive period. Bar mills are being backed up with semifinished stock. Hot rolled bands will shorten processing time for some sheet orders. Rolling schedules for shapes are being published and circulated.

Watch Profits—A top sales executive explains, "I don't think any mill will get back to giving warehouse service. For one thing, you can't afford the labor cost of loading mixed cars. Also, the regular warehouse system has improved."

There is no question the mills are determined to hold down costs and protect profit margins. However, it remains to be seen how well this thinking will stand up in the coming sales scramble.

Pressure for service concessions is sure to be strong. On the other hand, the need for avoiding unprofitable business was probably never more urgent. If steel marketing is moving into a new era and not just a brief phase, concessions made today become permanent cost burdens.

Congress Speeds Defense Changes

Changes in military appropriations mean a faster shift from traditional concepts.

And House action may be increased before Senate passes defense money bill.

■ The shift in this country's defense spending from traditional weapons to a missile-nuclear age program will be accelerated.

Congress, under tight control of Democrats fighting to build an election-year issue, is forcing the Eisenhower Administration to speed up spending for missiles, planes, advanced submarines, satellites, and research. At the same time, the lawmakers are ordering cuts in traditional military procurement and attempting to cut over-staffing and bureaucracy in the Pentagon.

Senate May Add—Pattern for defense spending for the 12 months beginning July 1 was set by the House last week when it passed a $39.3 billion defense money bill. In approving drastic revisions in the president's defense budget blueprinted by its appropriations committee, the House added a whopping $1.5 billion to the budget request to finance defense modernization.

Because of the election-year nature of these additions, there is a good chance that there will be more additions in the Senate, where at least two Democratic presidential candidates have based their campaigns, in part, on allegations of inadequate defense spending by the Republican administration. (Sens. Stuart Symington, and Lyndon Johnson).

Some Cuts—In boosting funds for advanced weapons and research, the House carefully offset all but $122 million of the increase with reductions in other fields. Chief among them were funds sought by the President for a conventionally-powered aircraft carrier and some funds for traditional weapons. In addition, the House ordered a 10 pct cut in military and civilian manpower in the Pentagon and called for a halt to the "enormous waste" in defense procurement.

In total, the House shifted some $4 billion within the President's budget.

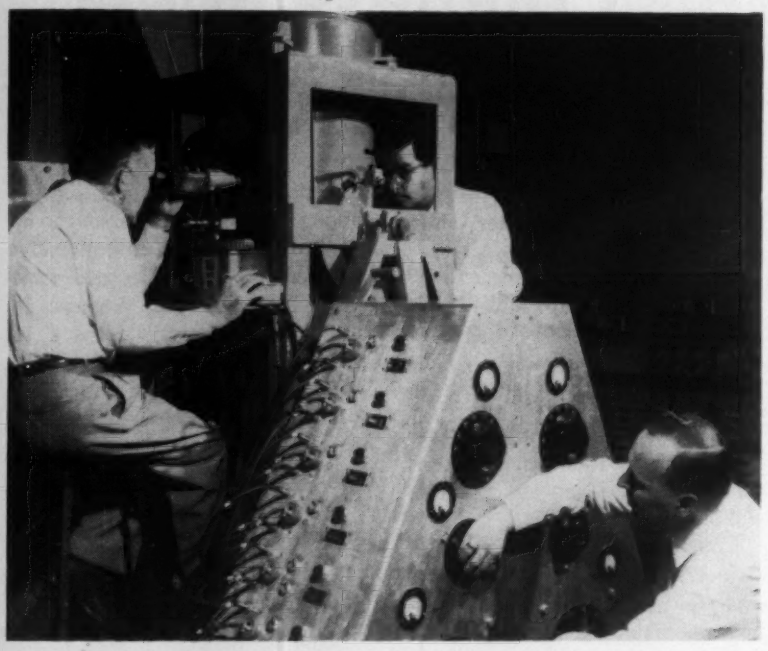
The Changes—Some of the major changes include:

Addition of $115 million to the $85 million requested by the Administration to stockpile aircraft parts and supplies to backstop a full-time airborne alert if necessary; an increase of $20.7 million for the Minuteman long - range missile, bringing the total to almost $500 million; an increase of $171 million to construct three additional nuclear-powered attack submarines not recommended by the Administration and $150 million for anti-sub research; and $241 million extra to speed up the Polaris missile-firing sub programs to build five and start work on seven more.

Largest single budget increase was $307 million in funds for research and development, bringing this total to $4.2 billion. Of the increase, $208 million will go for Air Force satellite programs. The Navy received a smaller boost, $99 million, but the Army lost a half-million dollars from its original request.

Nuclear Plane—The lawmakers went along with a request for $75 million to continue the Defense Dept.'s share of the cost of developing a nuclear-powered plane, but was again critical of the long delays and apparent lack of progress.

Researchers Study Semiconductors



EYES HAVE IT: Researchers at Bell Telephone Laboratories watch molten zone in ingot of gallium phosphide, a transparent semiconductor.

Foreign Industry Looks to U. S.

▪ A European maker of materials handling equipment, exhibiting at the World Trade Fair, now in New York, had to skip a large part of the second day of the show.

He dashed to Brooklyn where a U. S. visitor to his exhibit on the first day wanted to talk terms in the more businesslike atmosphere of his own office.

Moneymaker—The 4th World Trade Fair, like the first three, is heavy with special consumer products. But this year there is more heavy industrial machinery and equipment than ever before. And, from early indications metalworking exhibitors will be back next year. They are selling.

The Trade Fair, where foreign manufacturers exhibit what they want to sell in U. S. markets, is sponsored by the New York City Dept. of Commerce, This year there were over 3000 exhibitors from 65 countries.

Japan Exhibits—One of the most impressive showings of heavy equipment was by the Japanese.

This is the 100th anniversary of the signing of Japan's first trade treaty with the U. S. And the Japanese are going all out to make this a big export-to-the-U. S. year. In fact Japanese businessmen expect to export far more than they import in 1960.

Their theme at the Trade Fair is "The development of Japan's Modern Industries." There are 110 private Japanese companies exhibiting, six trade associations, and 17 commercial organizations.

The Biggest—The largest single exhibitor at the Fair is Mitsui & Co., Ltd., Tokyo. Of the 40 exhibits of this industrial empire 30 are metalworking.

The equipment being offered is modern. For instance, Koike Sanso Kogyo Co., Ltd., is offering electric discharge cutting machines and boring machines. The company admits electric discharge cutting was only developed (in the U. S. and USSR, says KSK) in 1946.

Unions Renew Drive For "White-Collars"

Unions are pushing an intensive new drive to sign up white-collar workers. Labor bosses are counting heavily on success of the drive to offset the continuing erosion of blue-collar workers from union ranks.

Engineers and technicians of every type are especially sought.

The AFL-CIO Executive Council in Washington is directing its new white-collar drive through a special committee. While the committee regards its main objective as the vigorous recruiting of white-collar workers at all levels, it also is faced with a ticklish internal problem—that of invasion by more aggressive unions of the "territory" regarded as private domain by older and less push unions.

Ike, Congress Set Battle Lines

The battlelines are drawn for the remainder of this congressional session. President Eisenhower's chances of getting what he wants from Congress are dim. Ike's latest actions and Congress' reactions:

Medical care for the aged: Ike recommends a "voluntary" alternate to Democratic plan. Congress probably will approve a Democratic version, inviting a possible veto.

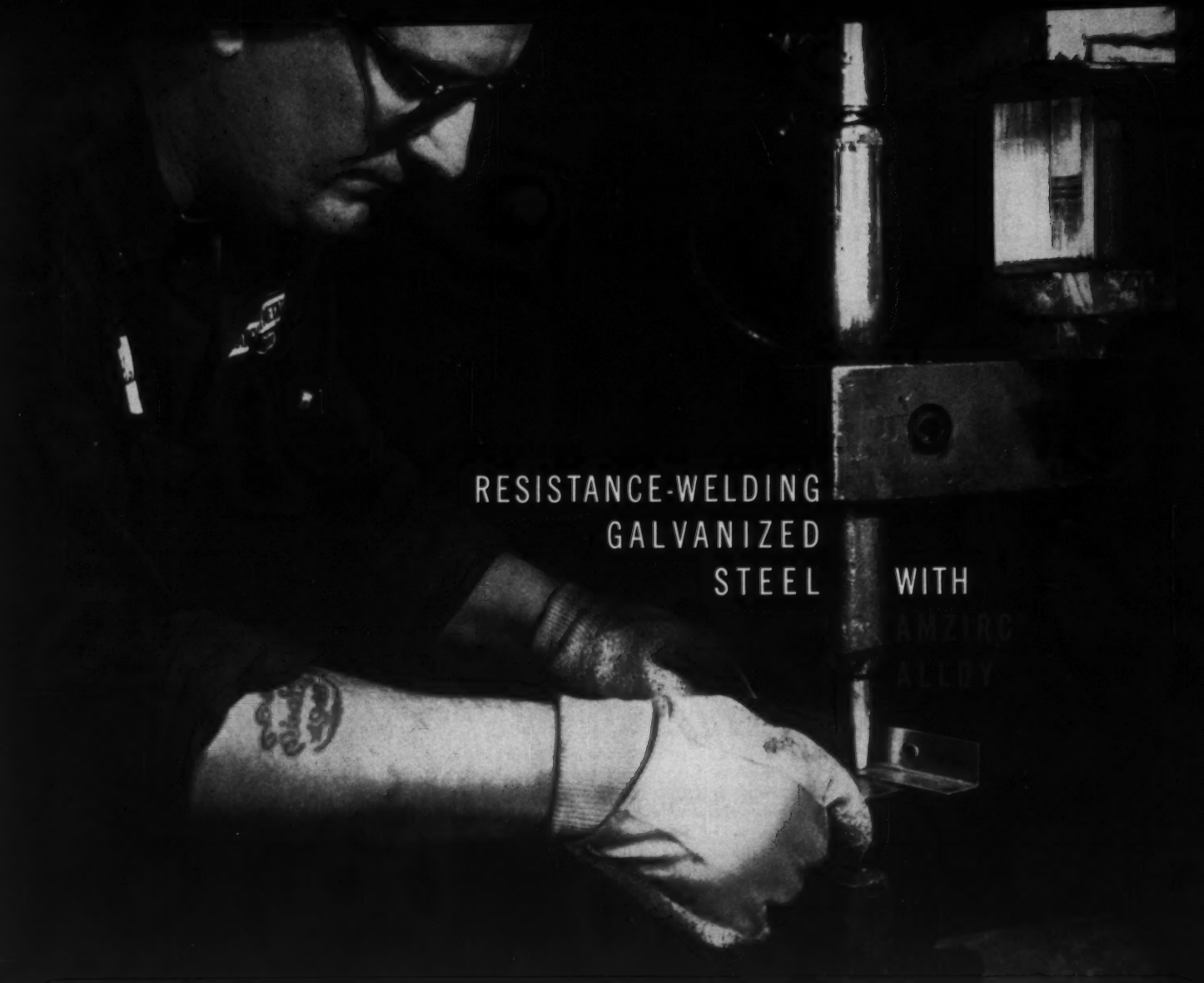
Help for chronic unemployment areas: On the president's priority list, but he opposes Senate-passed Democratic plan.

School construction: Ike wants his bond-financing plan; against Senate-passed Democratic plan for outright grants. Democrats will push watered-down version of their bill.

Minimum wage: Ike may win here. His 10 to 15 cent hike in $1.00 wage floor has better chance than the Democratic proposal.

Farm legislation: Eisenhower says ease controls, but has no solution. House Agriculture Committee working on Democratic plan which, if passed, is certain of veto.

Foreign aid: Congress will cut the president's $4,175,000,000 by $1 billion or more.



At Triangle Sheet Metal Works, Inc., Tips made of New Copper-Zirconium Alloy Minimize Electrode Pickup, Reduce Dressing, and Triple Electrode Service Life

Resistance-welding tips made of AMZIRC® Copper Alloy retain strength and hardness at elevated temperatures where copper and conventional alloy tips weaken and mushroom. Triangle Sheet Metal Works of New Hyde Park, New York, switched to tips made of AMZIRC. They find that AMZIRC's superior high-heat properties minimize electrode pickup, reduce frequency of dressing 30%, and shorten weld time. As a result, Triangle now gets three times more welds per tip than they did with tips formerly used!

Triangle is a leading sheet metal contractor and manufacturer specializing in the installation of industrial and commercial heating and cooling systems. They spot-weld galvanized steel ductwork under the following conditions: current—12,000 amps; pressure—1,100 lbs; heat cycle—5 secs; cool cycle—3 secs. Tips made of materials other than AMZIRC consistently annealed and mushroomed at these settings.

High Conductivity and Strength at Elevated Temperatures

AMZIRC consists of OFHC® copper (oxygen-free, high-conductivity) and a rigidly controlled addition of high-purity Zirconium. This unique combination makes AMZIRC ideal for applications requiring high electrical conductivity with high mechanical strength, *especially at elevated temperatures.*

For tips made of AMZIRC call your local welding supplies distributor.* For metallurgical information on AMZIRC contact AMCO's Technical Service Section.

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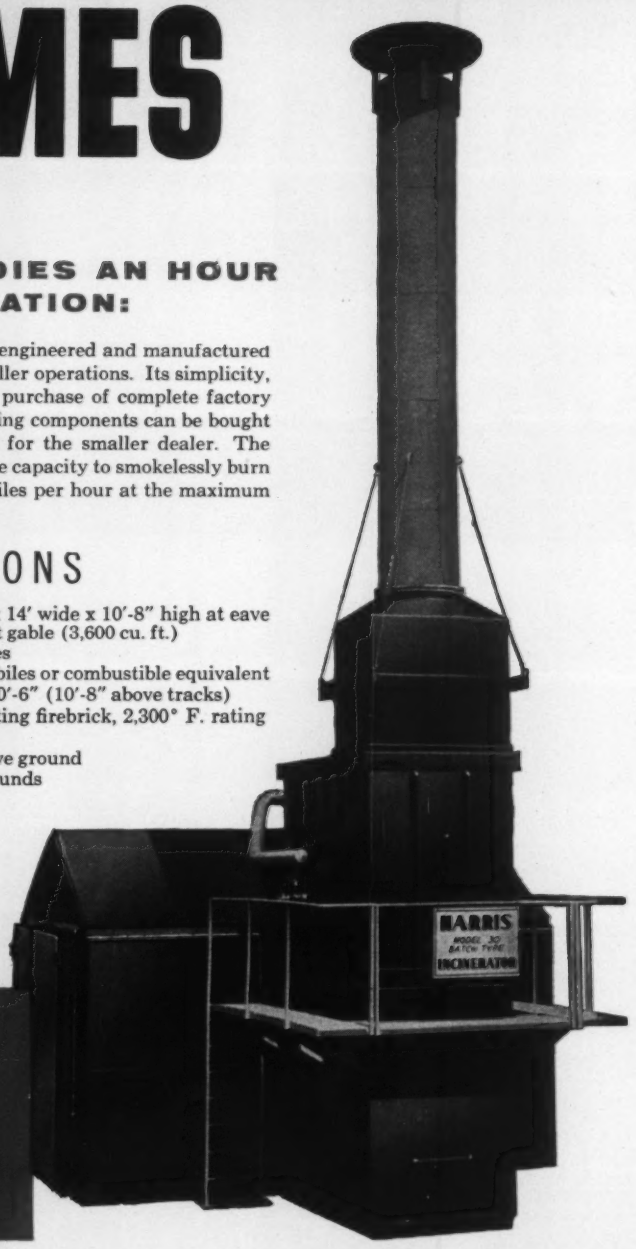
*AMZIRC is also known as N-4.

Harris Model 30 Batch Incinerator

CONTROLS SMOKE AND FUMES



HANDLES 4 AUTO-BODIES AN HOUR ...CONTINUOUS OPERATION:

This first of a complete line of incinerators being engineered and manufactured by Harris is intended to meet the needs of the smaller operations. Its simplicity, overall cost, and flexibility of installation permit purchase of complete factory built unit, or if you prefer, the major and controlling components can be bought separately. This provides an ideal arrangement for the smaller dealer. The exceptionally effective afterburner provided has the capacity to smokelessly burn all combustible matter, except tires, in 4 automobiles per hour at the maximum firing rate of 40 gallons of #2 fuel oil per hour.

SPECIFICATIONS

Kiln size	20' long x 14' wide x 10'-8" high at eave 14' at gable (3,600 cu. ft.)
Burning time	25 minutes
Hourly capacity	4 automobiles or combustible equivalent
Door openings	11'-0" x 10'-6" (10'-8" above tracks)
Afterburner lining	9" insulating firebrick, 2,300° F. rating
Stack diameter	36 inches
Stack height	35 ft. above ground
Estimated weight	55,000 pounds

Talk with a Man from Harris

HARRIS FOUNDRY & MACHINE CO.

Since 1889

CORDELE, GEORGIA

William E. Dunlap

He Contributes to Society

W. E. Dunlap started his firm after World War II in an old building and with little capital.

Today it has grown to be the biggest employer in Charlotte, Mich.

▪ William E. Dunlap, president of Aluminum Extrusions, Inc., Charlotte, Mich., would be the last to knock profits.

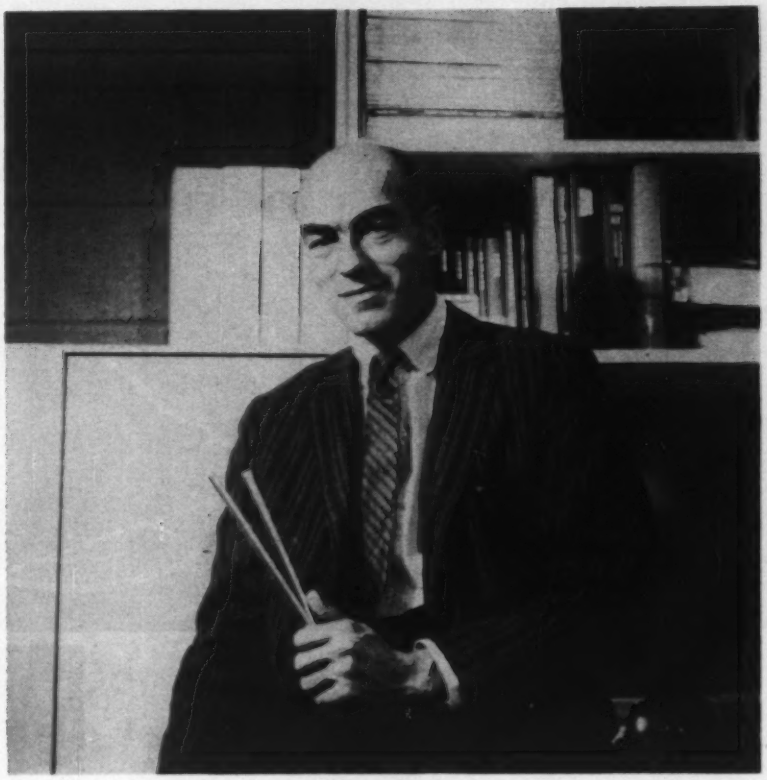
Mr. Dunlap and several associates built AE from a $15,000 investment right after World War II, to a current net worth of about $2 million.

Way of Life—But the AE president believes that with success comes responsibility. He explains: "The values in American life today are largely those of the corporation. Because the corporation is the most important single factor in the lives of many Americans, the corporation must make affirmative contributions to the good life. As businessmen each of us must create and contribute the best of which he is capable. There must be no compromise."

The key to Mr. Dunlap's ambitions is quality. He insists that "business success cannot be measured quantitatively, but can only be reflected in the mirror of quality."

Art and TV—He is now planning a series of fine arts exhibits right in the plant at Charlotte. His latest move: Aluminum Extrusions, Inc., is establishing what the company calls "the country's first chair in Educational Television." Initial plans, explains Mr. Dunlap, call for a series of five programs.

These programs will be given to educational TV stations on a strictly non-commercial basis. If the project is well received, Mr. Dunlap plans to do this on a regular schedule.



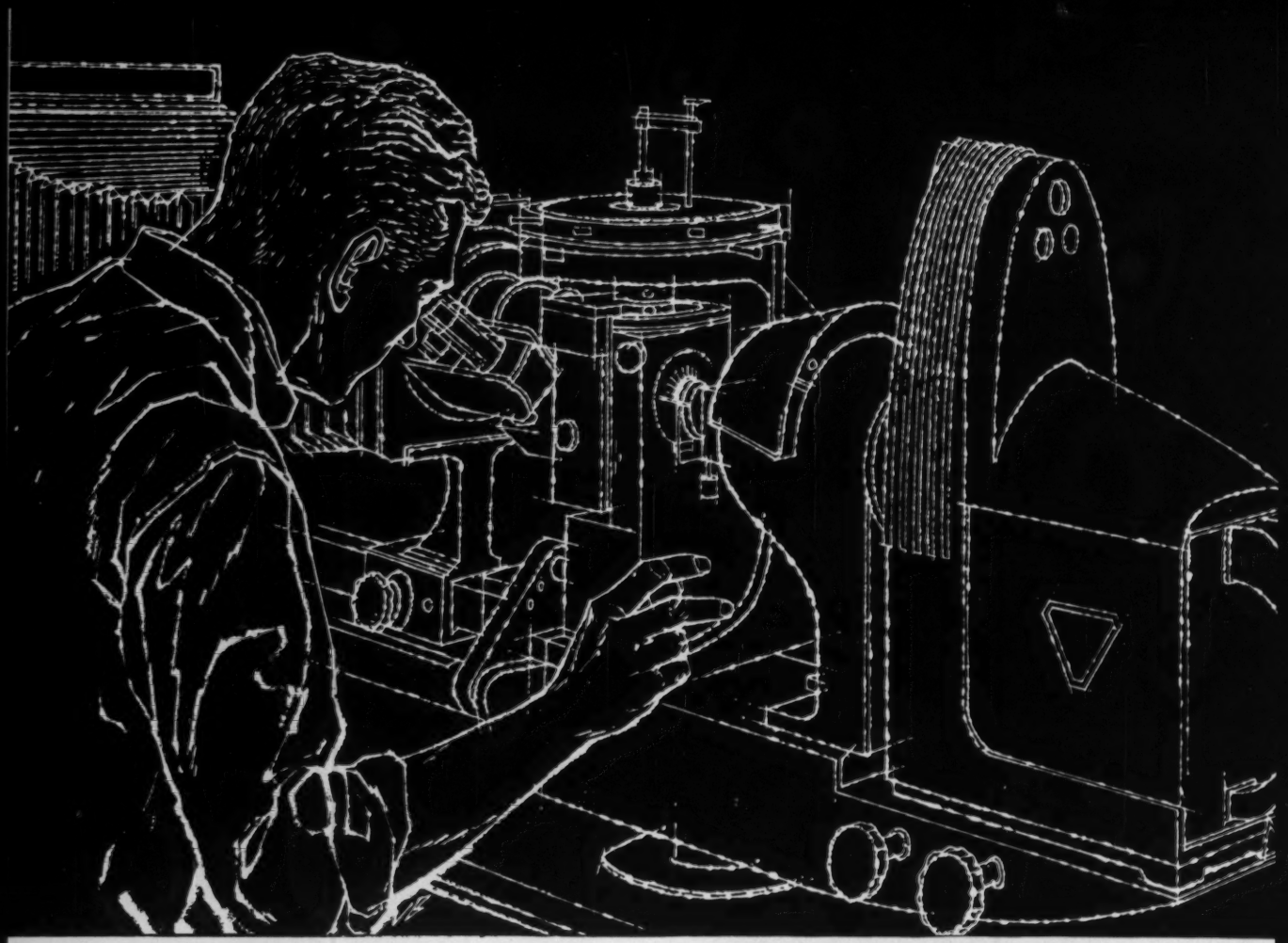
WILLIAM E. DUNLAP: "With success comes responsibility."

"Main Street" — The specially produced shows will "focus on the importance of distinguished architecture and design, and on the future of America's Main Street." They will feature Minoru Yamasaki, architect in Detroit; Richard S. Latham, industrial designer in Chicago; George Nelson, architect and industrial designer in New York. Mr. Nelson designed the U. S. exhibit in Moscow last year.

Actually, Mr. Dunlap got into the aluminum extrusion business almost accidentally. Like so many GI's after World War II, he decided not to go home. At the same time he applied for a job in South America, applied to college for entrance, and set up the company with several associates. He had worked in an extrusion plant before the war.

As Mr. Dunlap explains it, "The company just panned out first."

Lived In Plant—It was far from that simple. The new company got its building in Charlotte at no rent for several months because it was in a bad state of disrepair. The associates actually moved in and slept on cots as they made it fit for business. Now the company is the biggest single employer in Charlotte.



PRECISE CONTROL OF MICROSTRUCTURE

to your restricted specifications with

J&L Cold Rolled Strip Steels

The microstructure of strip steels can have an important bearing on the fabrication and mechanical properties of many critical components. All of the phases which combine to form the structure of a metal have their own specific properties.

J&L offers you an experienced organization devoted to strip steel processing combined with fully integrated facilities which permit precise control of microstructures.

Basic oxygen furnaces, high standard open hearth practice and electric furnaces provide optimum melting conditions; new hot strip mills are designed specifically to produce the finishing temperatures needed for inherent quality. Cold mills, annealing and normalizing furnaces and other equipment are designed and constructed solely for precision strip steel processing.

These integrated production facilities make it possible to assure the development of the microstructure required for critical applications.

For your convenience, precision strip facilities are available to you in our plants at Youngstown, Indianapolis, Los Angeles and Kenilworth (N. J.)

The small unit rotary annealing method assures precision temperature control and develops optimum hardness and microstructure for strip steels.

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How U.S. Will Help Exporters

The government isn't losing much time putting its export expansion plan into action.

Among the ideas: Improved ways to spread trade leads, all-out trade promotion in two "pilot plant" areas.

▪ Moves to boost U. S. export volume are coming rapidly.

The government is losing little time putting its recently announced export expansion program into action.

Some of the moves already made or in the planning stage have been summarized by Bradley Fisk, assistant secretary of commerce for international affiairs.

More Trade Lists—Already, he reports, there has been a step-up in the number of trade opportunities and trade lists sent to Commerce from all over the world. This results from instructions to foreign service personnel to put increased emphasis on trade promotion work.

Commerce is planning wide distribution of these trade leads. They have been published in the Department's Foreign Commerce Weekly and sent out to the agency's 33 field offices for years. Additional distribution has been made through business and professional trade journals, banks, Chambers of Commerce, trade associations and other outlets.

But to bring the leads more directly to firms interested in export, Commerce plans to use the services of 10 experienced businessmen, each in a different area of the country.

"Pilot Plant" Test—The export program is also getting a "pilot plant" operation. Commerce cooperating with the State Dept., has selected two countries—one industrially advanced and another newly developing—to try out a new idea. At the two locations—Dusseldorf, Germany and Kuala Lumpur, Federation of Malaya—staff members will give trade development their maximum effort. American firms interested in marketing efforts there will be given maximum service. Leads turned up at these areas will be fully developed both by Washington and by department field offices.

Aim of the pilot plant study: Testing the potential that could be generated by an all-out trade promotion effort.

Other Plans — Other ideas are getting active study. Plans have been drawn up to mount two World Trade Centers by January of next year. The locations: London and Bangkok, Thailand. At these centers, U. S. businessmen will have a chance to display their products on a rotating basis. The approach is an experiment, Commerce admits. But if it pays off, it could be continued and expanded to other countries.

Don't Overlook Plus Factors

▪ The weak elements in the economy—the inventory slowdown, the falloff in orders, housing starts, and the profit squeeze—are frequently listed.

Maybe it's time the "plus" factors also got some notice. To begin with, the construction picture is not all bleak (See story on page 101). Only residential building is expected to fall below 1959 levels this year.

As yet, industry shows few signs of cutting back on spending for new plant and equipment. The emphasis may be on modernization and cost-cutting improvements, rather than enlarging capacity. But the plans are firm.

The Sturdy Consumer—The drive to push exports (see above) is also encouraging. But, perhaps most encouraging is the attitude of the U. S. consumer. Despite all the talk about a turndown, he continues to go on spending.

The ratio of consumer credit to income has been running well above all previous records. But repayment of debt is being maintained, Commerce reports. Total consumer credit in February was $51 billion, down less than seasonally and above year-ago levels.

Inventories Rose In First Quarter

During the first quarter, business inventories made their greatest advance since the Korean War period.

On a seasonally adjusted basis they rose $800 million during March. This comes on top of increases averaging about $1 billion a month in January and February for the first quarter advance.

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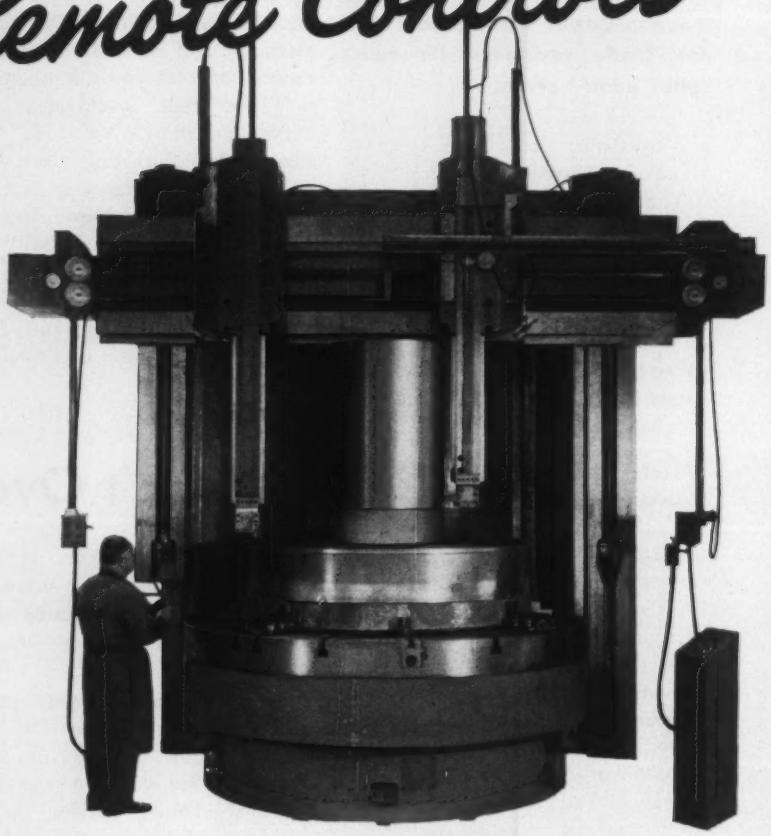
FEATURE *Simplified Remote Controls*

Within the span of a man's hand, utilizing a stationary and portable pendant, are all the controls necessary to actuate these modern giant mills. No climbing or clamoring for buttons or levers – every function of the machine is controlled from a position most advantageous to the operator.

The stationary pendant controls feed rate, table speed, starting and stopping of the table – also table jogging.

The portable pendant controls direction of heads in traverse or feed for either horizontal, vertical or 45° travel.



108" Dynatrol Vertical Boring and Turning Mill
Capacity – Maximum swing 120"; Height under rail – 80"; Ram travel – 60"; Table speed ranges, optional, Low 1.4 to 50; Int. 2.1 to 75; High 2.8 to 100; Feed rates infinitely variable from 0-500; available with Plain Table, or 4-jaw independent built in chuck.

This control system, and other revolutionary new Dynatrol features, enable the operator to utilize modern cutting tools at maximum speeds – cut to closer tolerances with superior finish – remove more metal per hour and keep the tool in the cut for more hours per shift. Table diameters of sizes 92, 108, 124 and 144 inches are available. Write or telephone for detailed catalog and complete information. The Bullard Company, Bridgeport 9, Conn., telephone Edison 6-2511.

* Trade Mark

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Explosive Growth Due in Autos

Government Forecasts 113.6 Million Vehicles by 1976

Before long, people will outnumber vehicles by only two to one. Autos, trucks, and buses are all set for growth.

And all vehicles will be driven further each year. — By A. E. Fleming.

■ Not many people can predict what the cars, trucks and buses of the 1970's will look like.

But the U. S. Bureau of Public Roads is forecasting the future of our automotive population. It seems the auto industry will more than keep pace with the national population growth well into the next decade.

Heavy Traffic—In fact, before long people will outnumber vehicles by only two to one. In looking into the Bureau's crystal ball, this general image emerges: Great hordes of vehicles flooding our metropolitan areas and pouring across our highways, traveling literally trillions of miles annually and consuming nearly 100 billion gallons of motor fuel a year.

With 1956 used as a base year, the Bureau points out that by 1976 there will be 37 pct more people living in the U. S.; they will own 75 pct more motor vehicles; they will travel 93 pct more miles a year; they will put 10 pct more mileage per year on each of their cars; their vehicles will use 94 pct more motor fuel.

State Surveys — These findings are based on state-by-state surveys (except Alaska and Hawaii) and depend, generally, on the continuation of recent trends in population, living standards, density of motor vehicle ownership and characteristics of motor vehicle use.

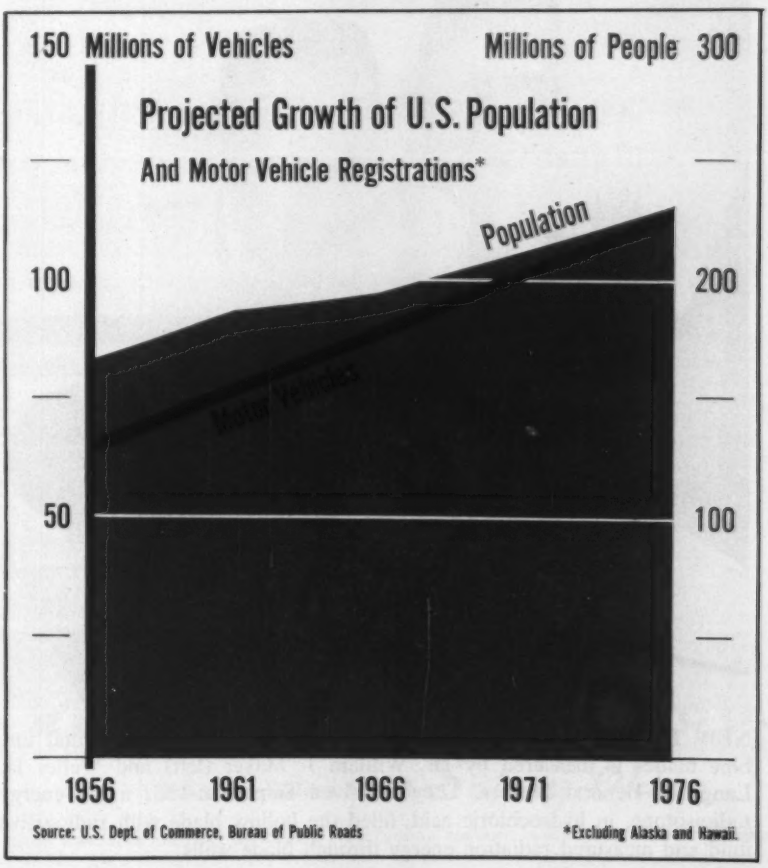
Sixteen years from now there are expected to be 154 million persons in the driver age group from 15 to 74 years old. They will be shuttling about in 113.6 million vehicles, 49 million more than 1956.

Commercial Vehicles—Passenger car population will parallel truck and bus population in growth. There will be 94.9 million cars in 1976, privately and publicly owned, compared to 54.5 million in 1956. The truck and bus total will swell to 18.7 million from 10.6 million. Cars represented 83.7 pct of all motor vehicles in 1956 and will take 83.6 pct in 1976.

In 1951 there were 33.7 vehicles for every 100 people in the U. S. This grew to 38.9 by 1956 and will further increase to 49.5 by 1976. The result: nearly one vehicle for every two people, and nearly three vehicles for every four people of driving age.

Rural Ratios—Density of car

People and Cars: More to Come



population—the number of vehicles per person—varies from section to section. It tends to be greater in rural states, smaller in extremely urbanized communities. Thus, Wyoming expects to lead this category in 1976 with 75 vehicles for every 100 persons. Montana with 70, is next, followed by Idaho, Kentucky and Kansas. Oddly, the lowest forecast comes from West Virginia (35 vehicles per 100 persons) with New York next (39).

Whether for business or pleasure, Americans will spend more time in cars, trucks and buses in the mid-1970's. They will journey 1.2 trillion miles in their vehicles in 1976, up 577 billion miles or 93 pct over 1956.

More Miles — Every vehicle in running condition will see more action in future years. It will be driven more miles in a year's time. The 1956 average, calculated by dividing total travel by total registrations, was 9566 miles. This will climb to 10,562 miles by 1976, up 10 pct.

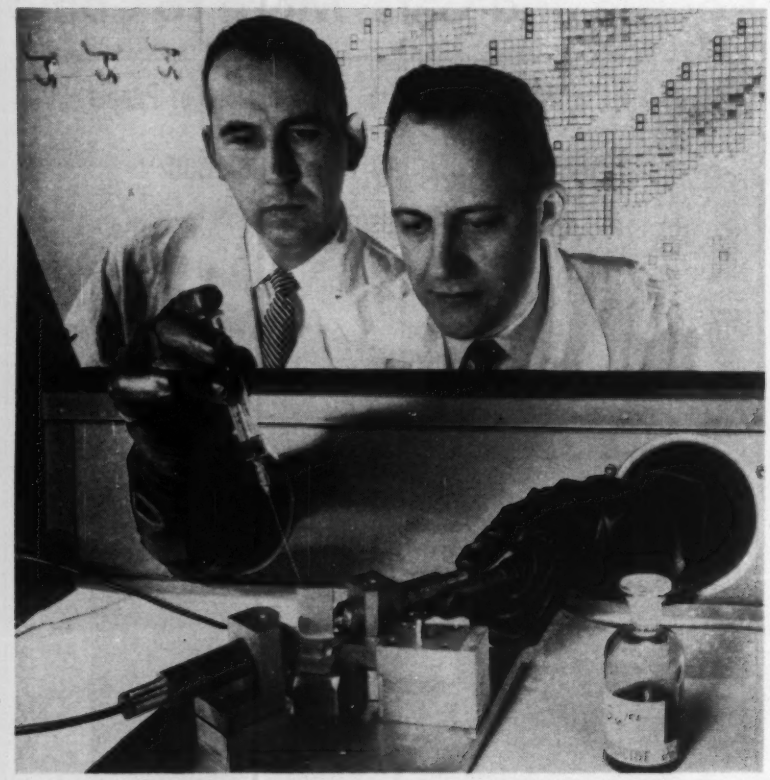
Possibly upsetting this estimate is the trend toward two-car families. The feeling is that a family that puts 10,000 miles a year on one car, won't necessarily put 10,000 miles on every additional car it buys.

Tending to offset this, however, would be the rapid development of suburbs; expansions of the highway transportation industry; growth of the U. S. economy, wealth and population; and more leisure time because of rises in per capita productivity.

Fuel Usage—The nation's oil companies should be eagerly looking forward to the approaching 15 years. Consumption of motor fuel is forecast for a 94 pct jump in the 1956-57 period, going from 50 billion gallons to 97 billion.

Speculation is mounting on the effect compact cars will have on fuel consumption. Most observers believe the effect will not be noticeable. Predictions are the average car will yield 12.36 miles to the gallon of fuel in 1976 against 12.46 in 1956.

Radioactive Fluids Measure Walls



NEW TECHNIQUE: Wall thickness of hollow Allison experimental turbine blades is measured by Dr. William J. Mayer (left) and Walter H. Lange of General Motors. They dissolved Samarium-153, a low-energy radioisotope, in hydrochloric acid, filled the hollow blade with radioactive fluid and measured radiation energy through blade walls.

Chrysler Snapback Cited by Colbert

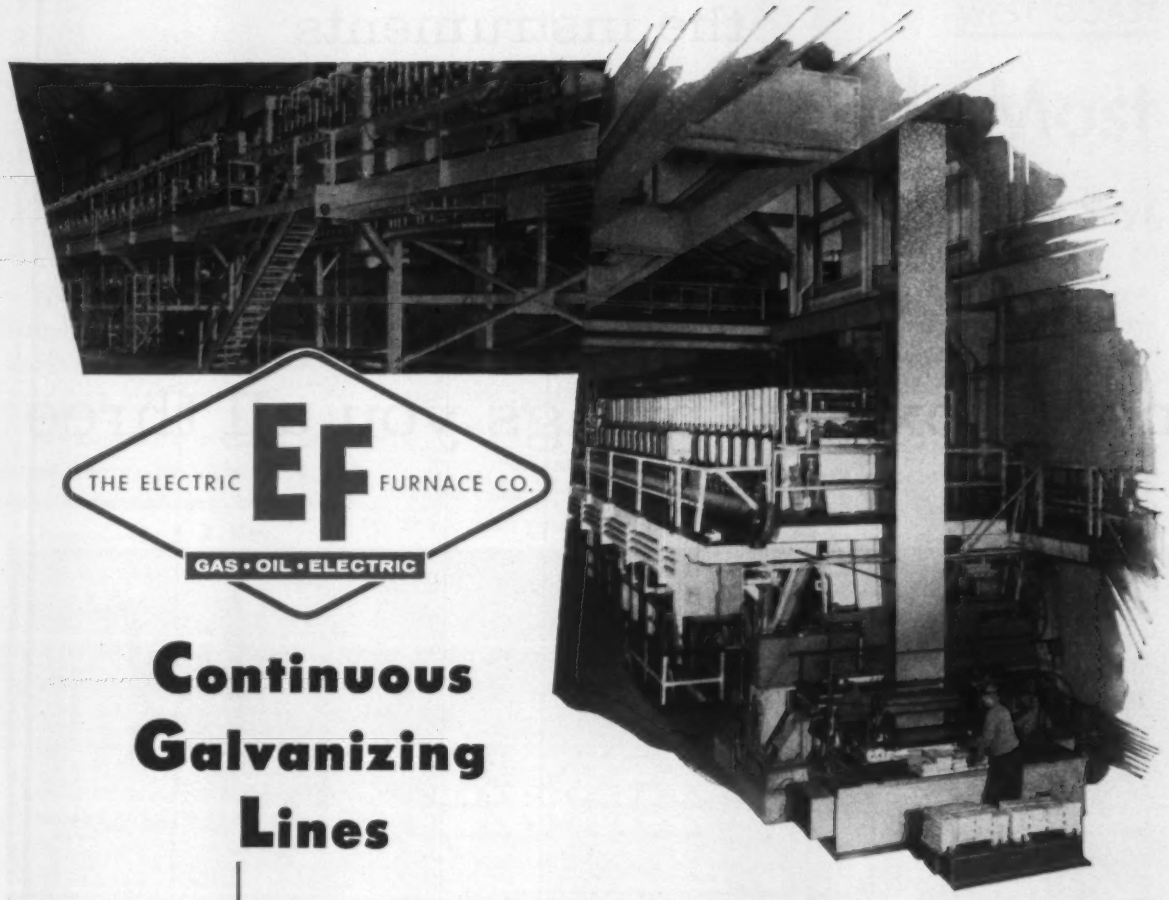
While announcing a Chrysler Corp. management shift (L. L. Colbert from president to board chairman and chief executive officer; W. C. Newberg from executive vice president to president) Mr. Colbert said premium steel prices hurt his company's financial operations from October through March.

With less production volume than either General Motors Corp. or Ford Motor Co., Mr. Colbert said the impact of premium prices was far worse on Chrysler.

Expensive Steel—He said Chrysler spent $26.5 million on premium price steel in January-March, above and beyond the cost of standard price steel. This outlay followed expenditure of $15 million to $16 million for premium steel in the last quarter of 1959. Thus the steel strike cost Chrysler Corp. from $41.5 million to $42.5 million in premium steel in the six months from October through March.

This, and $163.8 million spent in tooling 1960 models, has put Chrysler in a temporary profit squeeze, Mr. Colbert admits, although operations were in the black in the first quarter of 1960.

Car Sales Up—On the encouraging side, Mr. Colbert said Chrysler's percentage of U. S. new car sales has been climbing every month this year (16.1 pct in March) and sights are set on 20 pct of the market. "We don't care who we get it from," he said.



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assure unvarying uniformity of anneal and coating; high daily outputs with no un-scheduled downtime.

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* Tonnage output will vary depending upon width and gauge of strip being processed.

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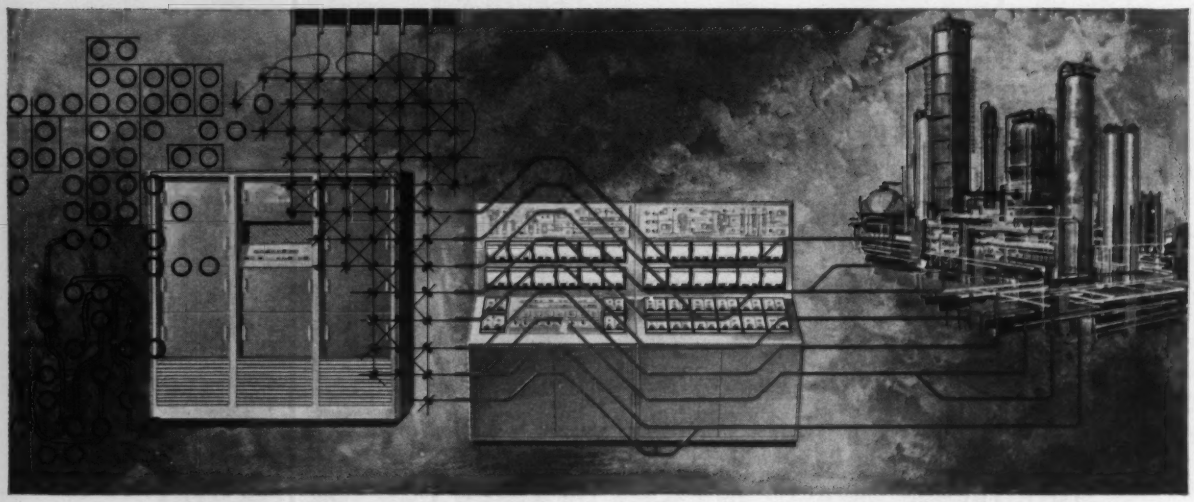

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What Farwest Area Needs Most

It's More Non-Defense Industry, Banker Says

West Coast industry is still largely defense-oriented, claims Keath Carver, Bank of America executive vice president.

For companies wanting to expand there, he lists both the area's advantages and disadvantages.—By R. R. Kay.

■ There are opportunities for aggressive industrialists looking to expand in the Farwest.

"But there are problems, too. And a realistic appraisal of them is a must for any firm considering a move to the West Coast."

That's the warning from Keath L. Carver, executive vice-president, Bank of America.

Basic Needs — His firm is the world's largest private bank, with $11.5 billion in resources. And it's deeply involved in the Farwest's industrial life. Though its activities are California-based, the bank has a vast influence on the whole area.

What's the region's basic need? Mr. Carver told The IRON AGE that the Farwest must have more non-defense industries.

Pros and Cons—The state adds 1500 new residents each day. The large crop of World War II babies will start their own families in five years. This will create an even larger need for more consumer and industrial products.

Mr. Carver says California's advantages are well-known to eastern industry leaders: Climate, recreation and education facilities, a large pool of scientists and engineers, overnight transportation from Los Angeles to a 14-million-consumer market, and abundant financing.

But take a hard look at a few of the drawbacks, Mr. Carver advises. Here are some top ones:

Lack of a widespread rapid transit system. This means new residents must fight a traffic tangle that gets worse every day.

Smog. Pollutant industries are no longer welcome in the Los Angeles basin. After pouring millions of dollars into pollution control, steel plants and oil refineries still face complaints.

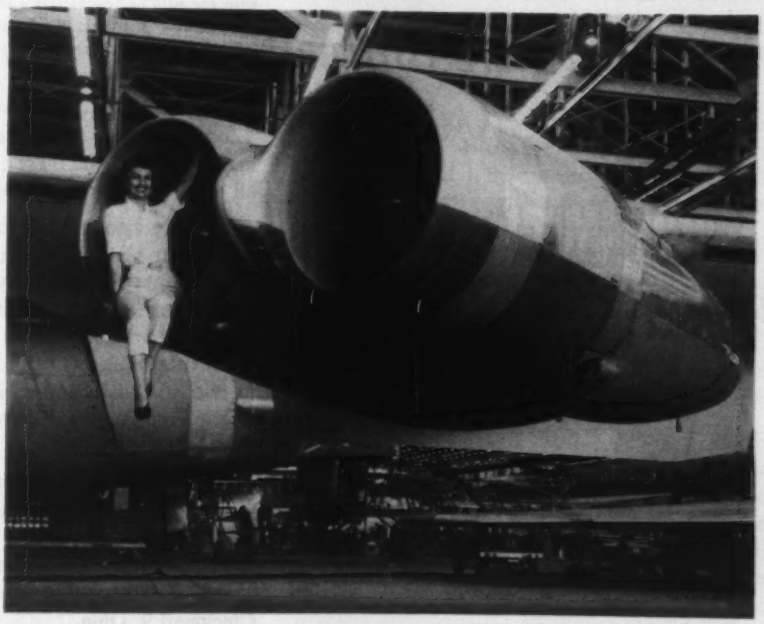
Steel. It costs more in California.

High-priced industrial land. Choice plant sites are higher than comparable parcels around Chicago or New York.

Things to Remember—Be sure to check on water and the state's tax structure. Either or both may have a strong influence on whether your company can make a go of it.

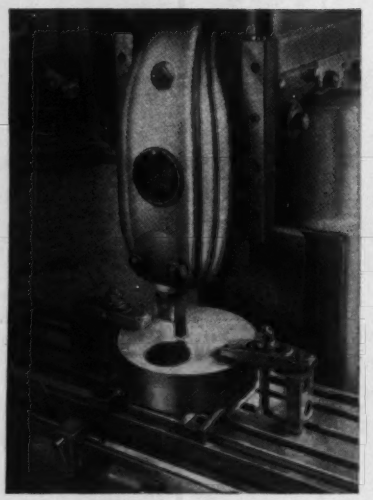
One more word of caution from Mr. Carver. "Being on the spot to serve the California market is a powerful incentive for industries chafing at the delays and rising costs in shipping from the East or Midwest. But the distance from west to east is just as great. And a firm without a large enough percentage of its own market on the West Coast will be facing the same transportation problems in reverse."

Missile Bomber Gets New Look

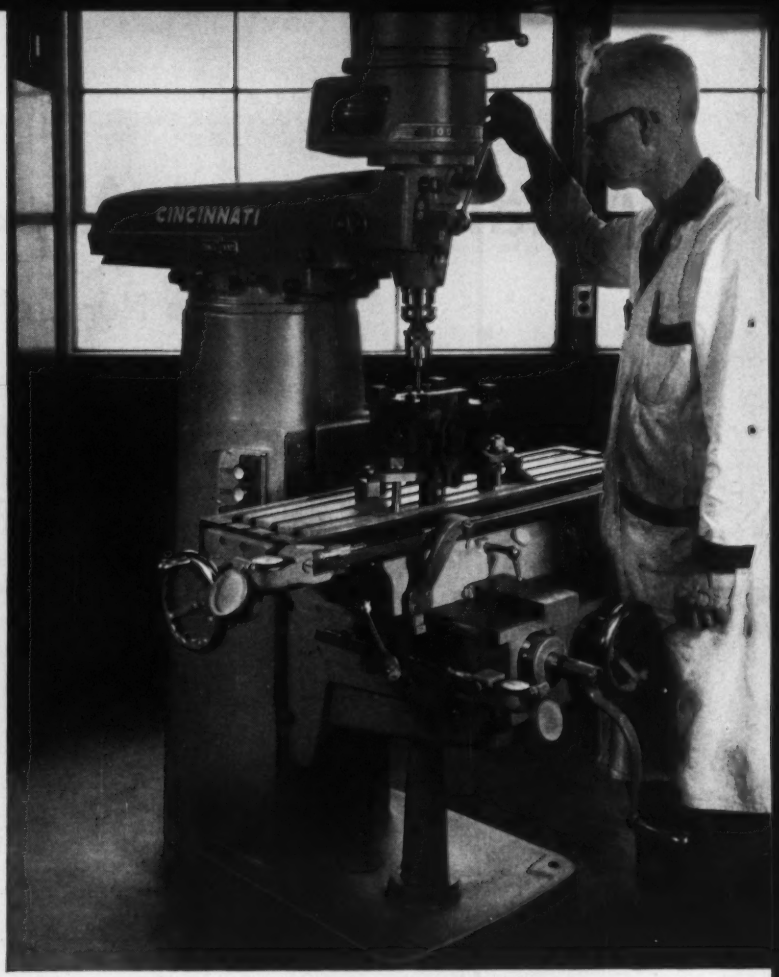


TURBOFAN ENGINES: Fan-type engines for Boeing's B-52H missile bombers will be "flown" on this test bed while production line is set up at company's Wichita, Kan. division. Engines are designed to increase the plane's range and boost its takeoff thrust.

CINCINNATI



The Shaping Attachment adds shaping and slotting to the variety of milling jobs handled by the Toolmaster. (Photos courtesy Bennett Metal Products, Wilmington, Ohio)



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Army Suppresses Tool Report

Johns Hopkins Study Charges Critical Obsolescence

Only part of a critical report on the Army's machine tool policies has been released. And that under pressure.

Johns Hopkins report charges tool reserve is obsolete. Army disagrees.—By G. H. Baker.

■ The Army has gone into tight-lipped huff over criticism of its machine tool policies.

Because a study by a group of management experts has labeled the Army's policies behind the times, the Army has stamped "Confidential" a great part of the report. The attempt, apparently, is to shut off full distribution of the report and discussion of the problem.

Johns Hopkins Report—The report, "The Army Production Base, Operations Research Office Report T-380," was prepared by a Johns Hopkins University unit at the Army's request.

Generally, the report charges that most of the Army's vast inventory of tools is already behind the times and will certainly be incapable of turning out the precision equipment required in modern warfare.

And it says that most of the Army's 88,000 tools, valued at about $1 billion, is now obsolete.

(For details on the report, see Machine Tools, P. 125.)

Army Reaction—The Army finds this hard to believe. Says Courtney Johnson, Assistant Secretary of the Army (Logistics): "The Army does not agree with the Operations Research Office's general conclusions in regard to the obsolescence of Army production equipment and the need for its replacement on a wholesale basis."

The rapid advance of military technology in recent years is chiefly to blame. Also, tool-builders have come up with better and more efficient machines each year in the normal course of tool industry progress, even without being spurred by the demands of advancing weapons technology.

Standing Pat—The Army has been sitting complacently on its huge tool inventory for nearly 20 years, replacing a few units each year. Chiefly, it acts as warehouser for this huge stock of tools that is largely incapable of producing the high-precision items needed in modern missile warfare.

Industry experts say up to 90 pct of the Army inventory is junk from a national defense point of view, and should be sold or scrapped.

The Army is caught between an honest desire to avoid depressing the tool market by dumping a lot of used tools and an unwillingness scrap the obsolete tools and get out of the tool business. So it prefers to just sit tight. But more used tools go into storage every year, so the situation is really in a state of flux whether the Army likes it or not.

What's to Be Done — What is likely to come of the Johns Hopkins report?

In the short run, nothing.

In the long run, the beginnings of a vigorous program of replacing the World War II and Korean War tools.

Congress Picks a President

■ Who will be the next president of the United States?

Senate Democratic Leader Lyndon B. Johnson would fill the nation's top position, if it was up to members of Congress and their staffs. He is the best qualified candidate for president, according to a poll just conducted by Roll Call, the weekly newspaper of Capitol Hill.

Sen. Johnson received 339 votes, or 44 pct, out of a total of 770 ballots cast by Senators, Representatives and Congressional aides. Vice president Richard M. Nixon was second in the poll. He received 150 votes, or 20 pct of the total.

How Others Fared—Other Democratic candidates and the vote each received: Sen. Stuart Symington, 84 votes, 11 pct; Sen. John F. Kennedy, 75 votes, 10 pct; Sen. Hubert H. Humphrey, 63 votes, 8 pct; Adlai Stevenson, 42 votes, 5 pct; Rep. Chester Bowles, 4 votes; Sen. Herman E. Talmadge and Rep. Randall S. Harmon, 1 vote each.

Rep. Charles A. Halleck received 10 votes and Gov. Nelson A. Rockefeller got 1 vote. They were the only Republicans to receive votes other than vice president Nixon.

The Party Line—The poll was conducted on a non-political basis. However, the vote closely followed party lines. Democratic candidates received 79 pct of the vote, Republicans received 21 pct.

Current representation in Congress is 65 pct Democratic, 35 pct Republican. A total of 47 Senators, 138 Representatives, and 585 Congressional aides voted in the poll.

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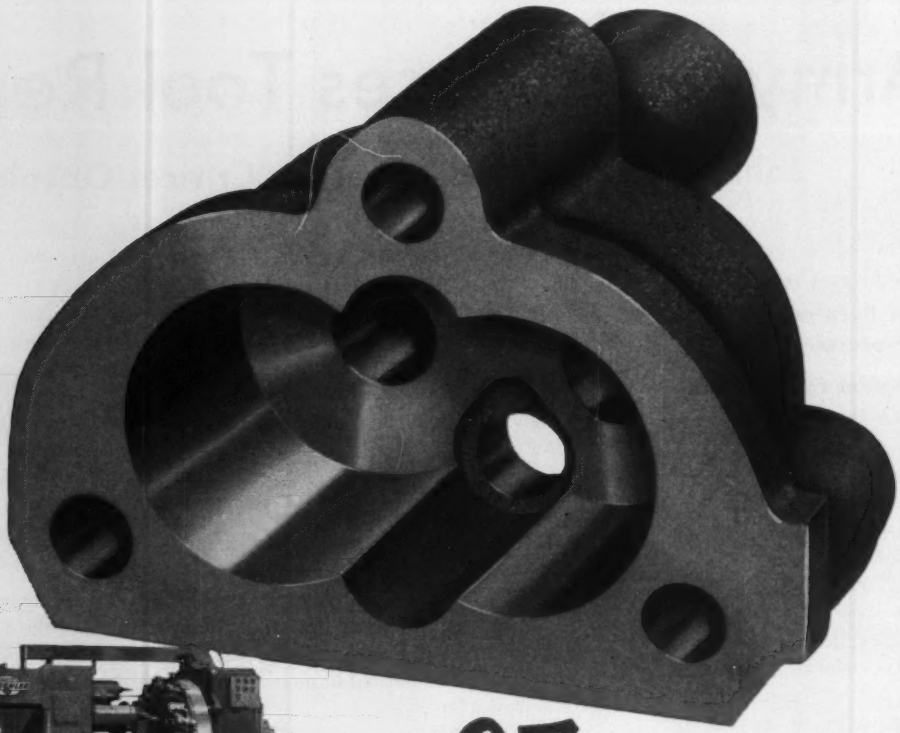

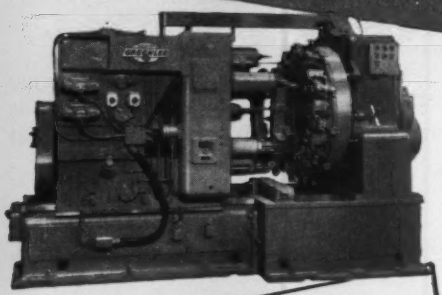

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Are Army's Tools Outdated?

Study Calls Productive Capacity Inadequate

Johns Hopkins report is critical of Army's policies on tool replacement.

It charges that the nation is ill-prepared for an emergency. —By R. H. Eshelman.

■ Just how bad is the Army's machine tool reserve?

Some of the facts emerge from the released part of the Johns Hopkins report. But a large part (just how much is uncertain) remains "Confidential." The released part is a 173-page report made by the Operations Research Office of Johns Hopkins.

(For Capital reaction to Johns Hopkins report, see Washington, P. 123.)

Close Look — The study looks hard into the status of the Army production base. Its principal concern is machine tools, which are defined as the primary production equipment of the metalworking industries that provide the defense services with material.

In plain talk, the U. S. productive capacity for war is not what it should be. The report notes that more than 40 pct of the Army's tools are over age. Private industry's machine tools are older, on the average, than the Army's. Many predate World War II; over 60 pct are 10 or more years of age.

Falling Behind — This evidence supports industry warnings of deterioration of productive resources. Not only is the country becoming unprepared to meet world threats of peaceful production competition, but it is equally ill-equipped for war production. And capacity is falling behind every year.

According to Johns Hopkins' researchers: "The record is clear. U. S. industries buy machine tools during national emergencies. The basic industries essential to military power have been ill-prepared for emergencies."

Barring all-out nuclear war, the big question is whether there would be time again to mobilize production. And is the country letting the national production machine gradually run down?

More Spending Needed—Current purchases of machine tools indicate that it is. They are poking along at a fraction of the pace needed to keep facilities up-to-date. Full modernization of U. S. metalworking industries would take a capital expenditure of $1.5 to $2 billion a year, these experts say.

The present machine tool procurement level is between $300 and $400 million a year. Crux of the decay lies in the 88,000 inventory of Army-owned machine tools. It's a static remnant left over from other emergencies. But not the mix needed in a new emergency.

Relying on the Obsolete — For modern weapons, new and advanced production methods and machines are needed. They are ready. Yet planners seem content to bank on this store of worn-out and obsolete tools.

It's ironic that the Soviet system can provide its industry with the newest and best equipment available, according to observers.

ASTME Elects New Officers

SET FOR SIXTY: Newly elected officers of the American Society of Tool and Manufacturing Engineers for 1960-61 are, left to right: Second vice president, David A. Schrom, works manager, York Div., Borg-Warner Corp.; first vice president, William Moreland, vice president, F. E. Myers & Bro. Co.; third vice president, Philip R. Marsilius, vice president, Producto Machine Co.; and president, H. Dale Long, president and chairman of the board, Scully, Jones and Co.

INDUSTRIAL BRIEFS

Labor Seminar—A management seminar in labor arbitration disputes will be held June 12-17 at Rutgers University, New Brunswick, N. J. The seminar is in cooperation with the American Arbitration Assn. Issues to be analyzed include seniority, discipline and discharge cases, management rights, job evaluation, wage incentives, and awards and opinions.

Widening Out—The Morgan Engineering Co., Alliance, O., has licensed the Dominion Bridge Co., Ltd., Montreal, Canada, to build and sell Morgan designed equipment in Canada. This will enable Dominion to complete its product lines from industrial through heavy end equipment.

Mining By Inland—Caland Ore Co., Ltd., subsidiary of Inland Steel Co., Chicago, has dedicated its mining operations near Atikokan, Ontario. It expects to become the largest in the Great Lakes region when it reaches capacity output of three million tons a year by 1969.

More Metal Lath—Republic Steel Corp.'s Truscon Div., Youngstown, O., has completed a $1.5 million program. It includes expansion and improvement of production facilities for metal lath and enlarging lath offerings. The new program increases to 40 the types of metal lath and accessories produced by Truscon.

Move in Manhattan—The American Zinc Institute, Inc., has moved to new quarters at 292 Madison Ave., New York. It will be occupied by the Institute, the administrative staff of AZI's Expanded Research Program, and the Lead Industries Assn.

Three Into One—A merger is being proposed of Minerals & Chemicals Corp., Philipp Brothers, Inc. and Philipp Brothers Ore Corp. The merged corporation will be known as Minerals & Chemicals—Philipp Brothers, Inc. Combined consolidated net earnings of the companies in 1959 were about $8.5 million.

Second in Des Plaines—A new plant is being built to house the new CONEX Div. of Illinois Tool Works, Chicago. Located at 1901 South Prospect Rd., it will be the second Illinois Tool Works plant in Des Plaines, Ill. The division will manufacture thin-wall plastic containers and packaging products.

Luria Relocates—Luria Bros. & Co., Inc., suppliers of scrap iron and steel, has relocated its Pittsburgh offices at Two Parkway Center, 875 Greentree Rd. Luria will share space with its subsidiary, Southwest Steel Co. They formerly shared quarters at 1101 Grant Bldg., Pittsburgh.

Plant for Argentina — Productos Thompson Argentina has been formed by Thompson-Ramo-Wooldridge, Cleveland, and Industrias Kaiser Argentina, an affiliate of Willys Motors. Capital of about $2 million was contributed in equal shares by the companies. The company will manufacture valves and automotive parts for the Argentinan automotive industry.

Sine Plates by Ex-Cell-O—Ex-Cell-O Corp., Detroit, has arranged to purchase the sine plate business of Omer E. Robbins Co. This will supplement and diversify the Ex-Cello-O line in the metalworking and gaging fields. Production and sale of the sine plates will be handled at Ex-Cell-O's Greenville, O. plant under the Magna-Sine trade name.

"I'm going to invite some government people in to get some pointers on evacuation!"

Brazing Alloys for Sale—Vacuum melted brazing alloys are now commercially available from the Metallurgical Products Dept., General Electric Co., Detroit. Applications include brazing of type 321, type 347 and other stainless steels and super alloys such as Rene 41. The wide gap series is also included.

Press for Reynolds — A large self-contained aluminum extrusion press will be installed by Reynolds Metals Co. in its Grand Rapids, Mich., extrusion plant. Installation of the 4000-ton press will begin about May 30. The unit is scheduled for production by mid-summer. It will be used to produce tubular aluminum extrusion for Reynolds' customers in the East.

Microwave Research — An Advanced Devices Laboratory has been formed at Airtron, a division of Litton Industries. It will enable a select group of specialists to devote full time to research and development of microwave sub-systems, components, and materials. The lab will be located at the Morris Plains, N. J., Airtron plant.

Felker Acquired — Bay State Abrasive Products Co., Westboro, Mass., has purchased the Felker Mfg. Co. of Torrance, Calif. The purchase gives Bay State a West Coast facility. Felker, which will be operated as a subsidiary, manufactures diamond abrasive cutting wheels and machines and accessories.

Developing Titanium Diboride—American Potash & Chemical Corp., Los Angeles, and Firth Sterling, Inc., Pittsburgh, will develop applications for titanium diboride in the aluminum industry. Development work will be done by Borolite Corp., a Firth Sterling subsidiary. Agreement also grants American Potash an option to purchase controlling interest in Borolite.

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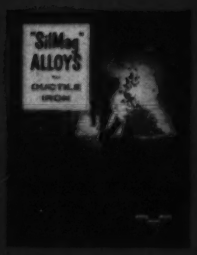

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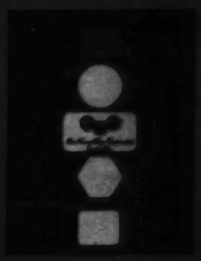

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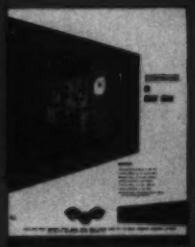

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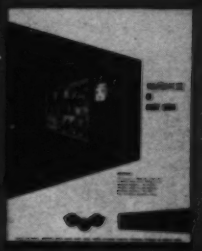

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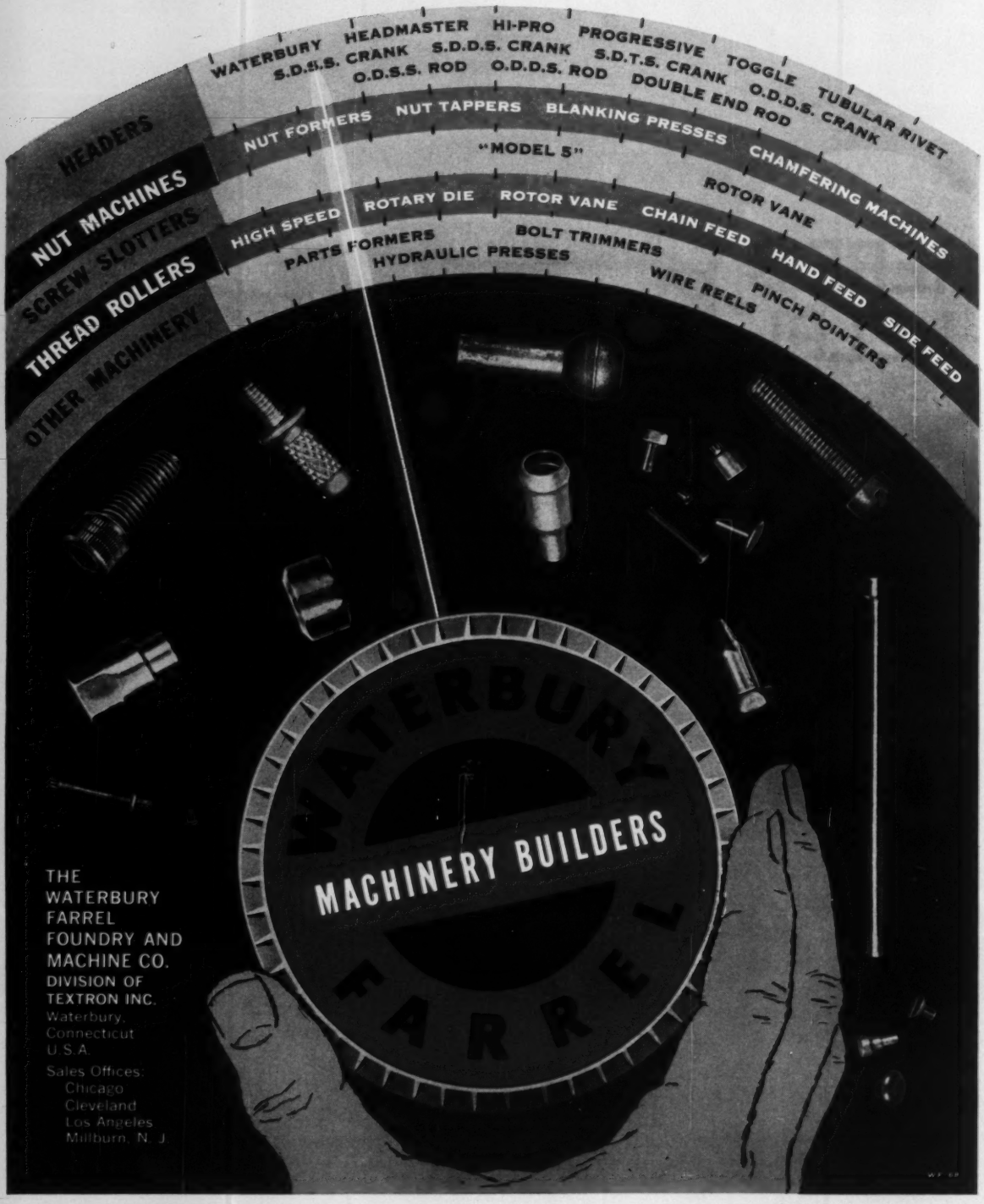

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J. R. Bartizal, elected president, Clearing Div., U. S. Industries, Inc.

The International Nickel Co. of Canada, Ltd. — **A. P. Gagnebin, R. H. Waddington** and **J. C. Parlee,** elected vice presidents; **J. A. Marsh,** elected president, Huntington Alloy Products Div., The International Nickel Co., Inc.; **Paul Queneau,** elected technical assistant to the president.

Chrysler Corp.—**L. L. Colbert,** elected chairman of the board, chief executive officer and chairman, finance committee; **W. C. Newberg,** elected president and chief operating officer.

P. R. Mallory & Co., Inc.—**G. B. Mallory,** elected president.

Aluminium Limited—**E. J. Mejia,** appointed senior vice president.

Sharon Steel Corp.—**H. G. Evans,** elected vice president, production, and **R. N. Merk,** named vice president, engineering.

Alco Products, Inc.—**W. G. Miller,** elected vice president.

Wheeling Steel Corp.—**W. M. Hall,** named vice president, market development.

Transue & Williams Steel Forging Corp.—**J. W. Ament,** becomes vice president, sales, Forging Div.; **C. J. Brunn,** elected vice president, sales, Stamping Div.

Ohio Crankshaft Co. — **A. H. Schott,** elected vice president.

Luria Bros. & Co., Inc.—**R. E. Schroeder,** elected vice president, Ohio district.

The Heald Machine Co.—**H. G. Howe,** appointed vice president and general manager; **G. C. Moore,** named domestic sales manager, and **C. H. Munsey,** named export sales manager.

Speer Carbon Co.—**Andrew Kaul III,** elected chairman of the board; **G. J. Fehrenbach,** named president and becomes chief administrative officer, and **W. E. Hall,** named chairman, executive committee.

C. B. Rex, elected vice president, U. S. Industries, Inc.

E. W. Bliss Co.—**E. W. Sundberg,** named treasurer; **W. H. Garrison,** named asst. treasurer and asst. secretary.

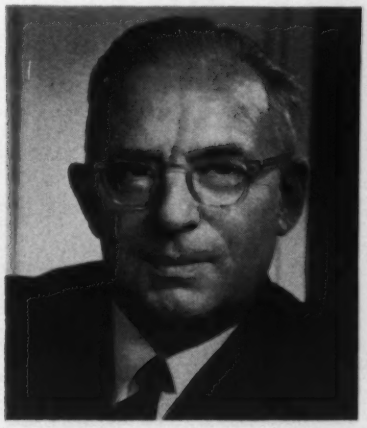
American Metal Products Co.—**R. J. Williams,** elected president, and **F. C. Matthaei, Jr.,** named executive vice president.

Clayton Mark & Co.—**Clarence Mark, Jr.,** elected executive vice president.

The Babcock & Wilcox Co., Refractories Div. — **J. D. Tournaud,**

(Continued on P. 130)

H. S. Wingate, elected chairman of the board and chief officer, International Nickel Co. of Canada, Ltd.



J. R. Gordon, elected president, The International Nickel Co. of Canada, Ltd.

R. D. Parker, elected senior vice president, The International Nickel Co. of Canada, Ltd.

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(Continued from P. 129)

appointed manager, Detroit district sales office.

Iron Fireman Mfg. Co., Heating & Cooling Div. — **J. H. Jordan,** elected vice president and manager.

L. A. Mertz, elected senior vice president, Dravo Corp., Pittsburgh.

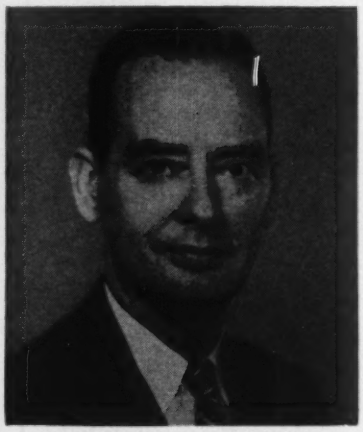
Udylite Corp.—**J. J. Rice,** elected treasurer.

The Youngstown Sheet & Tube Co.—**D. F. Pilz,** elected asst. treasurer.

Ingersoll - Rand Co. — **J. A. Wiendl,** appointed general manager, sales.

Allied Chemical Corp., General Chemical Div.—**F. J. Woods,** appointed director, sales.

Anaconda Wire & Cable Co.—**J. L. Vincent,** elected secretary and treasurer.



E. T. Fitch, elected vice president, financial, Dravo Corp., Pittsburgh.

J. W. Eason, elected a vice president, Revere Copper and Brass Inc., and executive head, Baltimore Div.

Clark Bros. Co.—**W. A. Roever,** appointed manager, Dallas district office.

Superior Tube Co.—**C. H. Pedersen,** appointed director, Mechanical Development Dept., Norristown, Pa.

Airborne Instruments Laboratory, Div. of Cutler-Hammer, Inc. —**H. M. Stephey,** named manager, military sales.

C. E. Widell, elected vice president, marketing, Wagner Electric Corp., St. Louis, Mo.

Jones & Laughlin Steel Corp., Container Div.—**C. W. Oberg,** appointed Cleveland district sales manager.

Taylor Fibre Co., Western Div.

(Continued on P. 133)

A-B QUALITY

NOTICE!

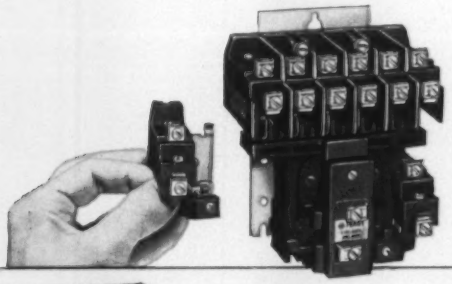
60 Second Contact Convertibility

ALLEN-BRADLEY CONTROL RELAYS

can thus easily be changed
from N.O. to N.C. (or vice versa)

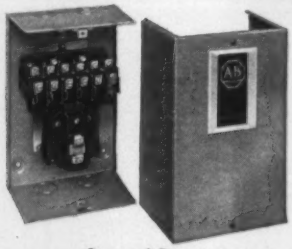
Why not give yourself a real surprise! We refer to the ease with which you can convert the contacts of these Allen-Bradley Bulletin 700 Type BR control relays. Using only a screwdriver, contacts can be changed from normally open to normally closed (or vice versa) in seconds—without removing the relay from its mounting—or its wiring. This "on-the-spot" convertibility certainly suggests an appreciable moneysaving reduction in your relay inventories.

Extensive tests have proven conclusively that the Bulletin 700 Type BR relays are good for many—and we mean *many*—millions of trouble free operations. A "built-in" permanent air gap completely eliminates all possibility of magnetic sticking. Naturally, the double break, silver contacts never need attention. Also, the molded coil is your assurance that even the most severe atmospheric conditions cannot cause trouble. Please write for full details on these relays today!

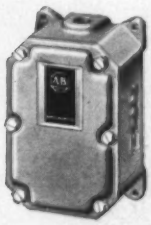


BUT HEAR THIS!

In the event that when "on-the-job" it is discovered that something was either overlooked or added, the standard Bulletin 700 Type BR—either 2, 4, or 6 pole relay—can easily have added to its base, out in the field, either one or two switching poles. It is done as easily as "falling off a log."

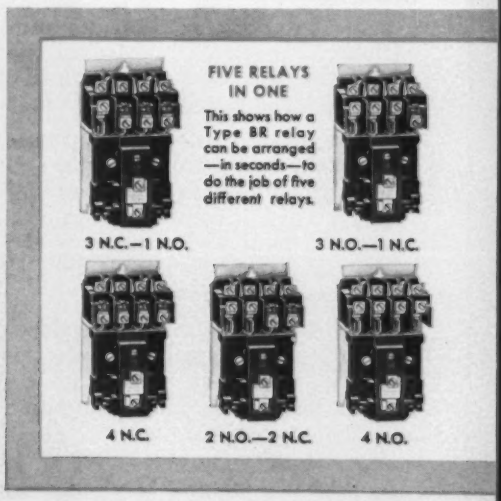


General-Purpose
NEMA 1



Explosion-proof
NEMA 7

Waterproof
NEMA 4


FIVE RELAYS IN ONE
This shows how a Type BR relay can be arranged —in seconds—to do the job of five different relays.
3 N.C.—1 N.O.
3 N.O.—1 N.C.
4 N.C.
2 N.O.—2 N.C.
4 N.O.

9-60-RM

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will provide positive protection for high-horsepower, high-priced motors!

It's sound "economy" to guard your investment in expensive motors and equipment against the extensive damage that can result from a phase failure or phase reversal. Allen-Bradley's Bulletin 812 Style RF relay provides *complete, positive* protection against both of these hazards.

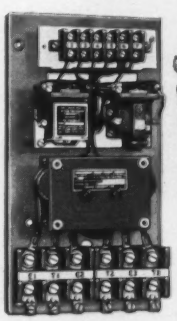
The Bulletin 812 Style F phase failure relay instantly detects *all* open phase conditions on a motor branch circuit and removes the motor from the line—yet is not subject to nuisance dropouts from transient line fluctuations. An unusual feature of this Style F relay is its positive response, regardless of motor load or type of motor branch circuit employed.

The Bulletin 812 Style R phase reversal relay disconnects the motor from the line—whether it is running or not—when a phase reversal occurs on the line side of the relay. Thus, it can be used to protect a single motor or a group of motors. Furthermore, the Style R relay removes the motor from the line should a phase failure occur while the motor is stopped.

All A-B Bulletin 812 relays are completely "fail safe." It will pay you to investigate this economical insurance against the heavy losses that can—and *frequently* do—result from phase failure and phase reversal. Write today!

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Bulletin 812 Style RF for Phase Failure and Phase Reversal consists of Style F Phase Failure and Style R Phase Reversal relays in the same enclosure.



Bulletin 812 Style F for Phase Failure

Bulletin 812 Style R for Phase Reversal

8-50-RH

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control

(Continued from P. 130)

—**E. R. Peterson,** appointed sales manager, LaVerne, Calif., plant headquarters; **E. J. Guelpa,** named general manager.

A. S. Burgoyne, appointed vice president and manager, Press and Die Supply Div., The E. W. Bliss Co.

J. M. Minore, elected vice president and general manager, North American Refractories, Ltd.

Ohio Ferro-Alloys Corp.—**W. D. McMillan,** named foundry consultant.

Westinghouse Electric Corp.—**Dr. S. J. Angello,** appointed manager, molecular electronics programs.

Jones & Laughlin Steel Corp.—**M. W. Davies,** appointed superintendent, Maintenance Dept., Cleveland Works.

Keuffel & Esser Co. — **James Cullen,** appointed St. Louis branch manager.

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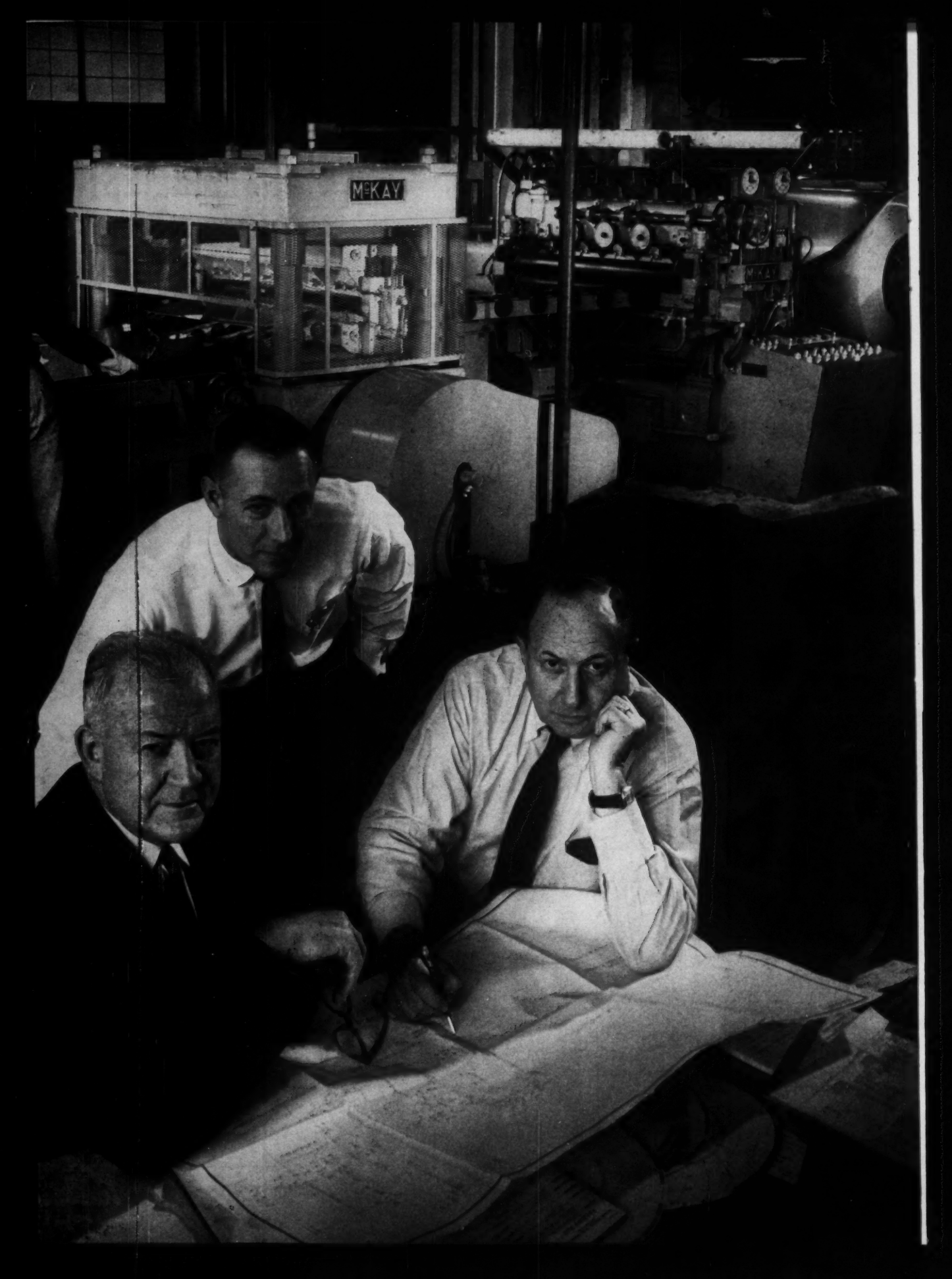
Here's a handy and helpful guide for selecting, designing and ordering factory made cable assemblies. Send for your copy of catalog No. 5601, to Macwhyte Wire Rope Company, 2900 14th Ave., Kenosha, Wis., U.S.A.

210

MACWHYTE Wire Rope COMPANY


McKAY

Revolutionary New McKaymatic* Die Shear Line boosts production ...cuts scrap loss for Eastern Stainless!

Photo by Arnold Newman shows (seated left to right) W. F. Schneid, vice president—general manager, and H. J. Verner, chief engineer of Eastern Stainless Steel Corp., discussing cost reductions in stainless steel processing with (standing) McKay Machine sales engineer, Robert D. Lynn, in front of a McKaymatic* Die Shear Line recently installed in Eastern Stainless' cold strip department

"We consider the McKaymatic* the finest advancement in shearing to come along in a great many years," says W.F. Schneid, vice president-general manager, of Eastern Stainless Steel Corporation, Baltimore, Md. "We have reduced production time, cut our scrap loss, and have recorded an overall increase in department efficiency as a direct result of this new McKay die shear line," Mr. Schneid continues.

Eastern Stainless is a prime supplier of stainless steel sheets, strip and plates, for aircraft and missile parts, for food, chemical, paper and textile machinery and for architectural uses. It produces 25 grades of stainless steel in its own modern electric furnace facilities, and ships about sixty-six percent of it in sheet form.

Programs many grades instantly—Through improved roller leveler techniques, Eastern Stainless found it was able to instantly program many grades of sheet through its new McKaymatic* Die Shear Line. The line decoils, levels in a 17-roll McKay Roller Leveler, measures by electronics and cuts to length—replacing a cut-up, re-level, and re-square operation prior to boxing. Production of cut lengths has been substantially increased.

The result, they report, is cost savings. Says Mr Schneid: "As a result of our efforts to improve customer service, we installed this line to speed up production of these cut lengths. It has enabled us to break a production bottleneck for which there seemed to be no solution."

Line eliminates stretcher leveling—Mr. Schneid continued that production time has been reduced on sheets of five grades as a result of being able to eliminate stretcher leveling and re-squaring procedures. Also, he said, the scrap loss on re-squaring has been eliminated as the sheets are cut clean and square on the McKay line. Net effect of the installation was a definite increase in overall departmental efficiency.

H. J. Verner, chief engineer, remarked that the McKay roller leveler could process these grades of stainless, within its capacity, to flatness approaching that obtained from the stretcher method. He reported that the Die Shear Line is being used to prepare for shipping cold rolled sheet from 4" to 48" in width, up to .050" in thickness, and in lengths from 36" and greater at normal production speeds. He particularly likes the McKaymatic* Die Shear Line for its ability to handle high finish stainless without edge or surface damage.

Available in many sizes—The McKaymatic* Die Shear Line is available in sizes to accommodate most commercial widths. Composed of decoiler (with coil car, if desired), roller leveler, measuring device, and cutoff press, it satisfies most requirements for sheet length accuracy and squareness, flatness, edge and surface quality protection and output rate.

For short runs or long, the McKaymatic* Die Shear Line will better any other line in economy and efficiency. Whatever your cut-to-length problem, McKay Machine's engineers have a solution. Write for literature; send your specific needs for a quotation to *McKay Machine Company, Youngstown 1, Ohio.*

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You Arbitrate It!

DOUBLE DUTY

From the files of
The American Arbitration Association

■ In preparation for a visit from an important customer, management of a metal-cabinet company decided a certain department needed a thorough cleaning. The foreman estimated that the whole job could be done in eight hours by someone who could operate the fork lift for one hour, and sweep up rubbish the rest of the time. So, a fork-lift operator was called in for overtime on a Saturday.

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the June 9 issue.

Equality for All—That led to a grievance by the regular sweeper who thought he should have gotten the day's work. He cited a contract clause that read: "Insofar as is practicable, overtime will be distributed by the company equally among employees performing the same or similar operations."

"You aren't qualified to operate the fork lift," the foreman answered. "It wouldn't have been practicable to call in two men when there was work enough for only one man."

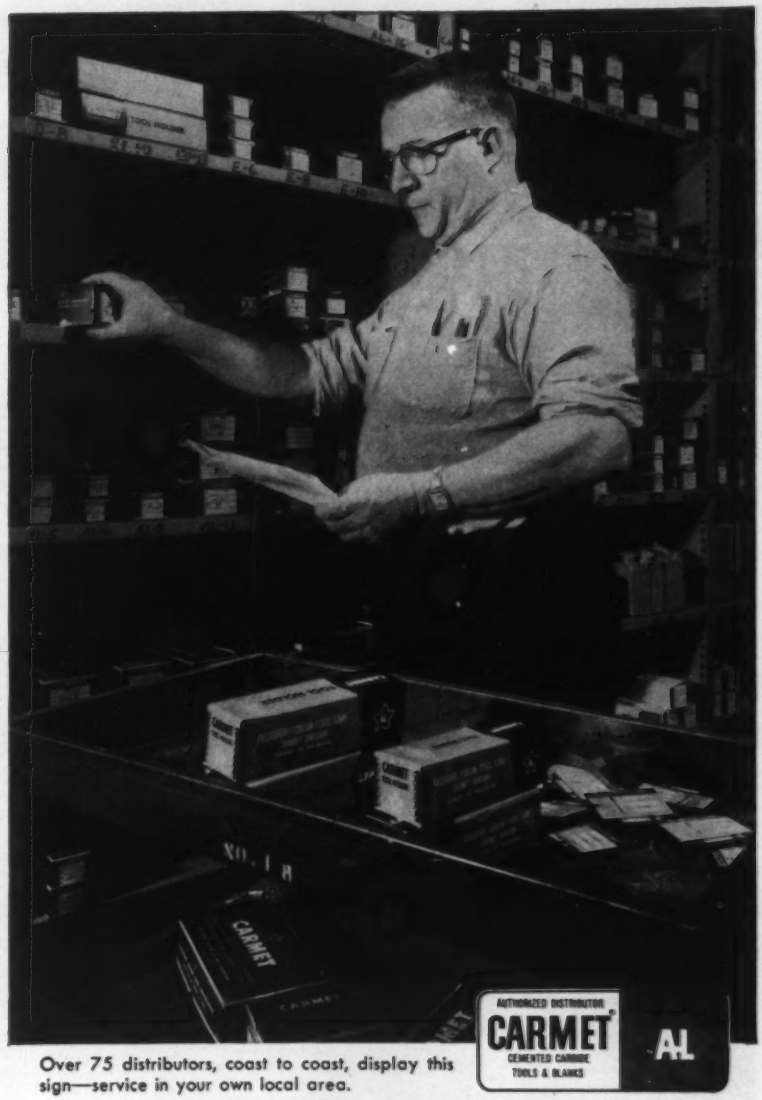
Eventually the case went to arbitration under the rules of the American Arbitration Association. How would you rule?

The Arbitrator Ruled:

The arbitrator said it might have been wasteful to call in both the sweeper and the fork-lift operator, but that didn't mean it wasn't practicable. The parties had negotiated an overtime provision which, in some situations, results in waste of money, he said, but he reminded them that all he could do was interpret their agreement, not alter it. The grievance was sustained.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.

Off-the-shelf delivery of Carmet® Carbide Tools from your local CARMET Distributor



Over 75 distributors, coast to coast, display this sign—service in your own local area.

Keep your inventory of Carmet Carbide Tools at a comfortable level. Keep your working capital free for other needs. Your Carmet distributor carries the load—that's how he's set up to do business.

He carries your needs from the complete line of Carmet Carbide Tools in all grades and every style. He is geared to deliver your orders quickly—a phone call gets action.

And if you get in a production jam, special service is his middle name. Remember, your Carmet distributor knows carbide tooling—with the help of the local Carmet technical man, you get all the help you need.

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Steps You Take Today...

Fred Wiles of our Apparatus Division describes an application of digital techniques to an industrial data logging problem.

Data Accumulation for Processing Lines

Industry's move toward continuous process production rather than quantized output production has brought a need for methods of logging data descriptive of the finished products. Some examples of such continuous output production processes in the Steel Industry are electrotinning lines, side-trim and inspection lines, continuous annealing lines, recoil lines, temper mills and cold reduction mills.

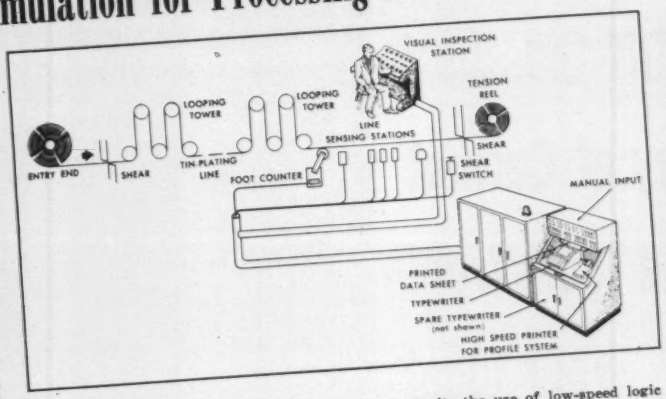
AIL has developed a Data Accumulation System for such process lines and has built a number of such systems. Such a system, operating on an electrotinning line, is shown in the illustration. The AIL design includes three identical computer sections operating in parallel. The answers from the three computers are compared on a two-out-of-three basis. If there is any difference in the three answers, the majority rules and the correct answer is printed out. Meanwhile, the system indicates that a disagreement has occurred.

The data are collected from a number of sensing devices mounted along the output section of the production line and from a manual station where visually detected defects are fed into the system. The sensing and manual entry devices are spread over some length of line. It is essential that all defects be correlated with the point on the strip at which they occur; this gathering of defect data into their appropriate points is accomplished within the computer unit.

The main section of each of the three computers accumulates the data into forty registers, each having a 29-bit capacity. Binary-coded decimal is used in the computer sections.

The output section of each computer provides buffer storage for the accumulated totals to compensate for the speed of the output printer or typewriter. The single two-out-of-three "voting" section follows the buffer storage computer sections. It causes the correct answer to be fed from the appropriate buffer storage to the output device via a binary-coded-decimal-to-decimal converter and a print-format programmer. The output device can be a printer, typewriter, tape punch, magnetic tape recorder, or other device.

The output of the AIL Data Accumulator provides a measure of the footage of prime quality material, the footage of reject material, and the total number and locations of occurrences of each type of defect. In addition, data such as order number, date, crew number, coil number, and other pertinent fixed information are printed out to provide complete and useful quality control records. The fixed information is manually entered into the system via dial switches or punched cards. Shift or daily totals are also included in the printout.



The computer sections utilize AIL plug-in transistorized logic modules (flip-flops, Nor units, driver units, and pulser units). The memory unit is composed of magnetostrictive delay lines; thus, the entire computer unit is composed of solid-state devices.

The twenty channels in each computer do not exist as separate physical entities. Rather, they exist in the timing with which they enter the recirculating delay lines. Each channel carries two types of totals, thus accounting for the forty totals in each computer. Each computer has only one high-speed arithmetic unit. The major portion of each computer services the channels in such a manner that the one arithmetic section operates sequentially on all the channels.

Another advantage of this time multiplexing is the utilization of the inherent high-speed capability of the delay lines without the requirement that the whole system use expensive high-speed units. One small section of high-speed computer elements separates, in a time-sharing manner, the pulses entering and leaving the magnetostrictive delay line. The output of this pulse-interleaving section is of low-frequency, suitable for low-speed components.

The relationship between the number of interleaves and the number of bits stored in the delay line is such that a bit leaves the line from one interleave and is re-entered into the line on the next interleave, progressing through all interleaves before returning to its original interleave. The required relationship exists when the number of bits and the number of interleaves are relatively prime. It is this interleaving that permits the use of low-speed logic units without the loss of the advantages of the high-speed delay lines.

Correct timing of the input information is accomplished by asynchronous operation of the delay lines. Incoming information from the sensors is stored briefly and then entered into the delay lines. The orbit time of the information in the delay lines is set at something faster than the speed of operation of the production lines. These two factors are so related that the required equalization is produced.

A footage tachometer accurately determines strip length. The tachometer is carrier-operated so that zero-spaced operation is possible. In additions, hysteresis effects are utilized to prevent the tachometer's adding in a large foot-count when the line stops quickly and the tachometer rocks back and forth between the edges of two of its adjacent segments.

Included in the system is a battery supply, which is switched on instantaneously when power fails. Thus, a power failure will not cause loss of information accumulated in the system.

A complete bound set of our fourth series of articles is available on request. Write to Harold Hechtman at AIL for your set.

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Drawing on long experience in electronic measurement, computation and control, they are successfully applying new, dependable solutions to problems of sensing, data accumulation and automatic control in metal processing. One such installation is discussed on the opposite page. If you plan to modernize your equipment, upgrade your product, speed up your production or simply want to take a closer look at your present processing line, we would like to hear from you.

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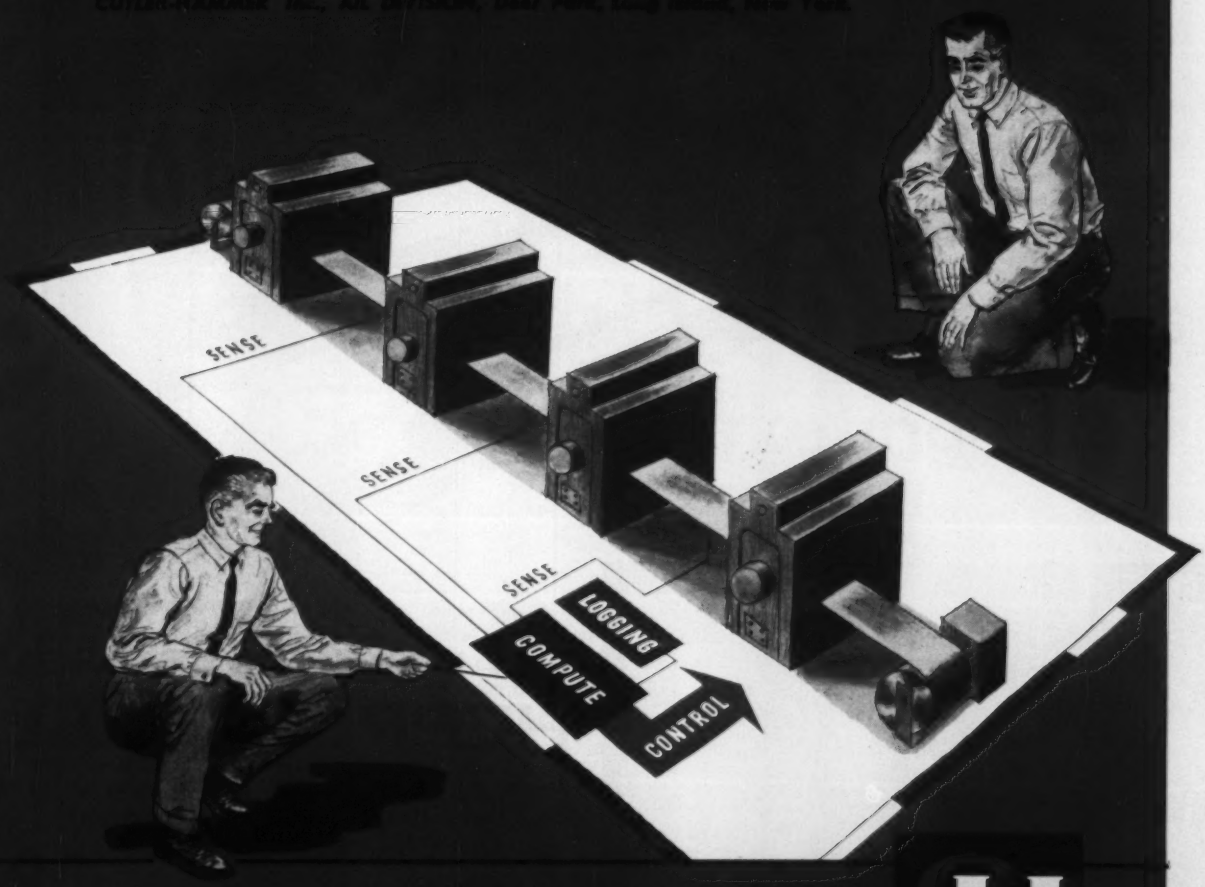

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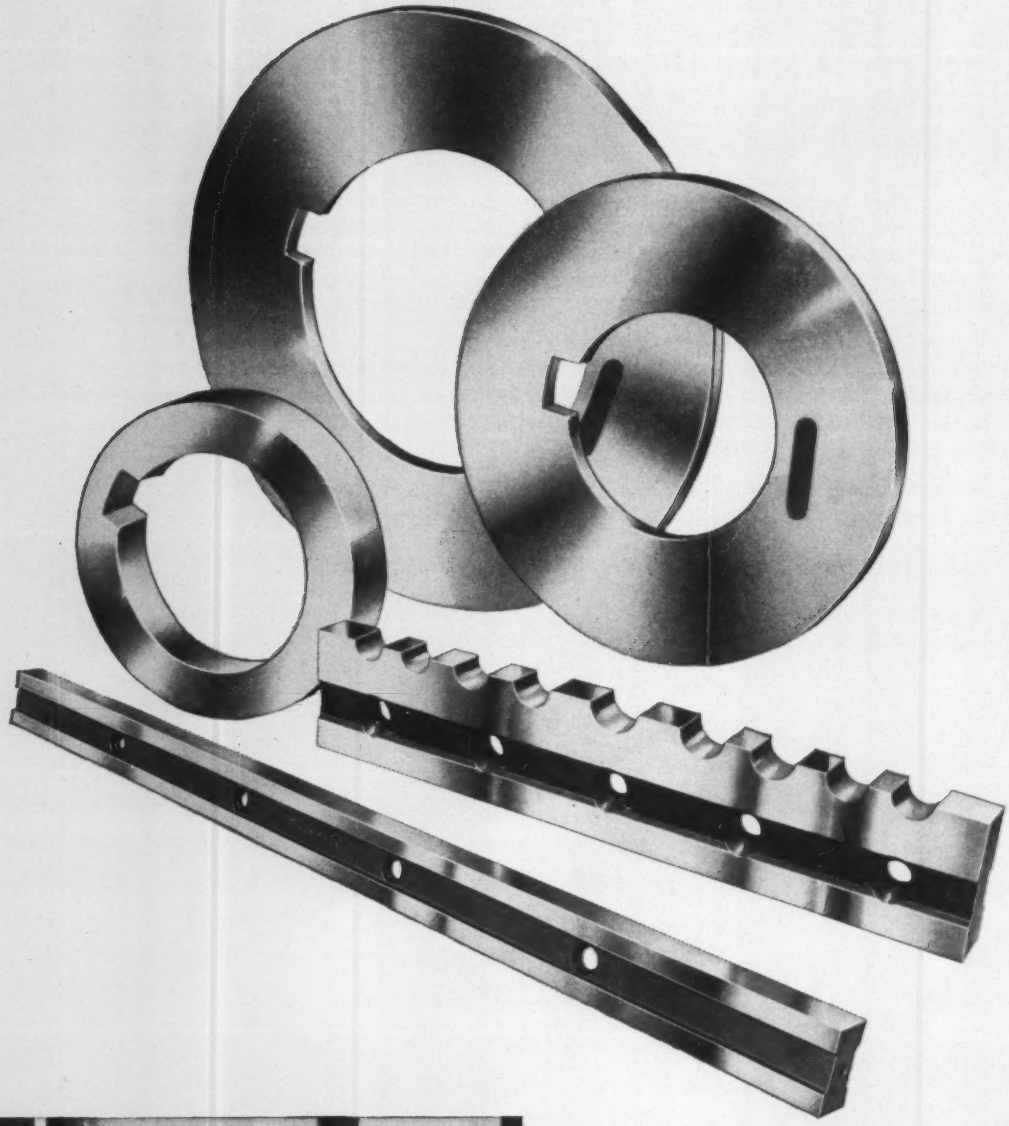
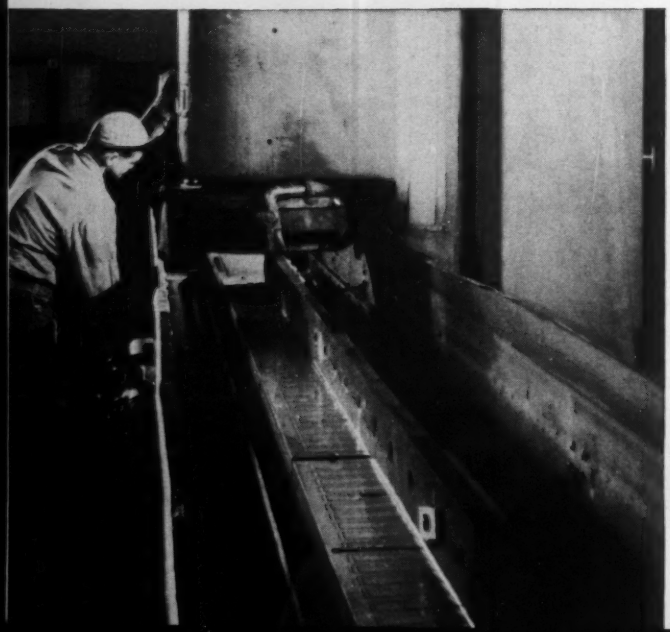
Deer Park, Long Island, New York

H
CONTROL





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THE THIRD PARTY: Designers like W. P. Margulies (left) and J. G. Lippincott help the engineer and the marketing man shape ordinary products into functional designs that reflect a "quality image."

How Industrial Design Affects The Total Marketing Effort

By **J. G. Lippincott and W. P. Margulies**—Lippincott & Margulies, Inc., New York

If American companies are to compete in world markets we must give the consumer what he wants: Functional products of top quality, designed for a quality image.

■ Four years from now, Flushing meadows will once again be the site for the New York World's Fair. It it's anything like the last one, it could serve as a critical evaluation of American economy.

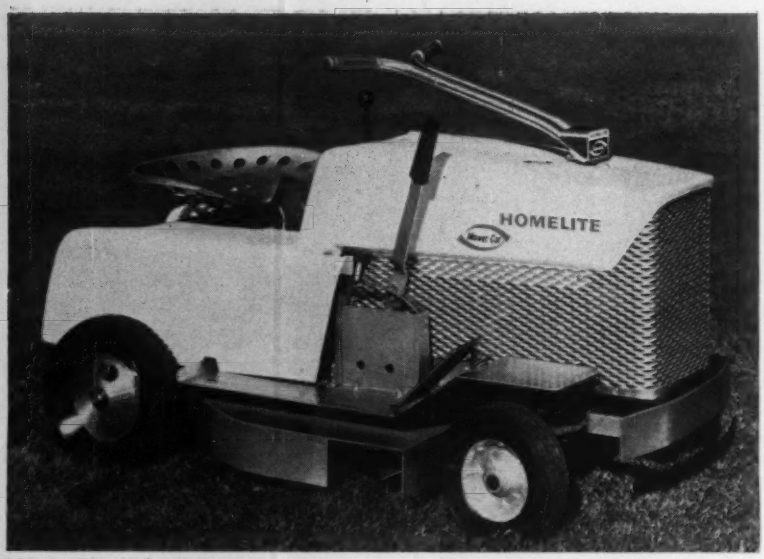
Will the American exhibit attract the crowds as eagerly as the exhibits of other nations? Will we still have a favorable balance of trade in 1964? Right now, it's only $1.1 billion in our favor. And each day the picture might darken more.

The United States is still the world's master in the technique of mass production. But we're finding out that you can't live on that alone. Hold onto those fast rates of production and add greater design to each product. Throw out the frills. Instead, concentrate on good service and pleasing, meaningful appearance.

The First Team—The engineer, the marketing man and the designer (who understands both) must pool their talents and knowledge. This has to be done if American business hopes to maintain its place in the markets of the world.

One of the leading builders of machine tools and lathes has watched its foreign sales drop from 25 pct to 8 pct of its total business. Other machine tool makers have had like experiences. It's getting to be routine. Foreign companies are underbidding them by some 25 to 30 pct.

More Figures—Look at Japanese steel. Exports of steel mill products from Japan to this country have shot up from $7.8 million in 1957



SUMMER WORKHORSE: Well-engineered Homelite lawn mower features appearance design. Wrap-around aluminum grill emphasizes machine's power. The control panels underscore simplicity of operation.

to a whopping $83.4 million in 1959.

In 1959 some 600,000 foreign cars were sold in the United States. Look at the American builders of farm machinery. They controlled about 100 pct of the world market five years ago. Now they only have about 60 pct. And they expect to lose 10 pct more in a few years.

Not Price Alone—It's easy to say that they're under-selling us. In many cases this is true. But that's not the only reason people buy foreign goods. People buy them because in performance and design the foreign product has achieved — and lives up to — a "quality image."

In short, the design of these products is based on true innovation rather than yearly style obsolescence. This concept is backed up by an all-out marketing effort.

Know Your Market—Some of the more costly failures in this country would seem to indicate that the breakdown in marketing products begins at the beginning—with research. Makers of packaged goods would hardly think of launching a new product without thorough market research.

In the realm of hard goods, the product has become the package. It must sell itself. Too often, however, manufacturers of such products rely on "their knowledge of their customers" or on research tailored to match their ideas. Hence, they fail at the gatepost.

Casual Approach—Many companies think that marketing is simply a matter of getting new product ideas from the salesmen. They'll tell you this makes sense. The salesmen know what the competition is doing. Or a company may aim for some arbitrary price like $49.95. Then it cuts costs where it has to.

But what happens to all that talent within the R & D group? It just becomes an agency for the rubber stamp, governed at every step by cost accounting. Now that foreign competition has so nearly sounded the death knell of design for style obsolescence, product development must give new scope to the engineer.

So let the engineer work for real product innovation. Once he finds it, back him up with the marketing support it deserves.

Compare the Two—Take a look at the door of any foreign car. Then compare it with the door of any U. S. model. The gap between the door edge and body varies from a hairline on the foreign car to the width of a pencil on the American make.

This kind of sloppy tolerance and lax production requirement is another reason why foreign models are taking over. American industry made a reputation in this area of painstaking production quality control. The manufacturer must return to this old philosophy.

Each year the average European is living a little better. As he prospers, his taste for luxuries will also

Some Companies Are Saying . . .

". . . appearance of our products on the machinery room floor is important. We should **retain industrial designers** to improve it."

". . . we believe that product **appearance is important.** But we are not sure that it really affects sales of our products."

". . . a good engineering design is clean, **functional and good looking."**

". . . we feel sure that the **customer will pay more** for it."

". . . when a new product is developed industrial **design services** are **necessary and valuable."**

". . . appearance design is done by our engineering department, **but only when** the sales department **experts pressure** for it."

grow. New foreign markets will open up for American-made goods —but only if the product is designed sensibly.

Survey Data—Lippincott & Margulies, Inc., Industrial Designers, made a recent survey of 21 manufacturers. The annual sales of each one of these companies ranged somewhere between $350 million and $1½ million.

From the survey, it was learned that industrial design, if it's used at all, is engineering-oriented. The outside designer, it seems, works closely with the company's own staff of product planners.

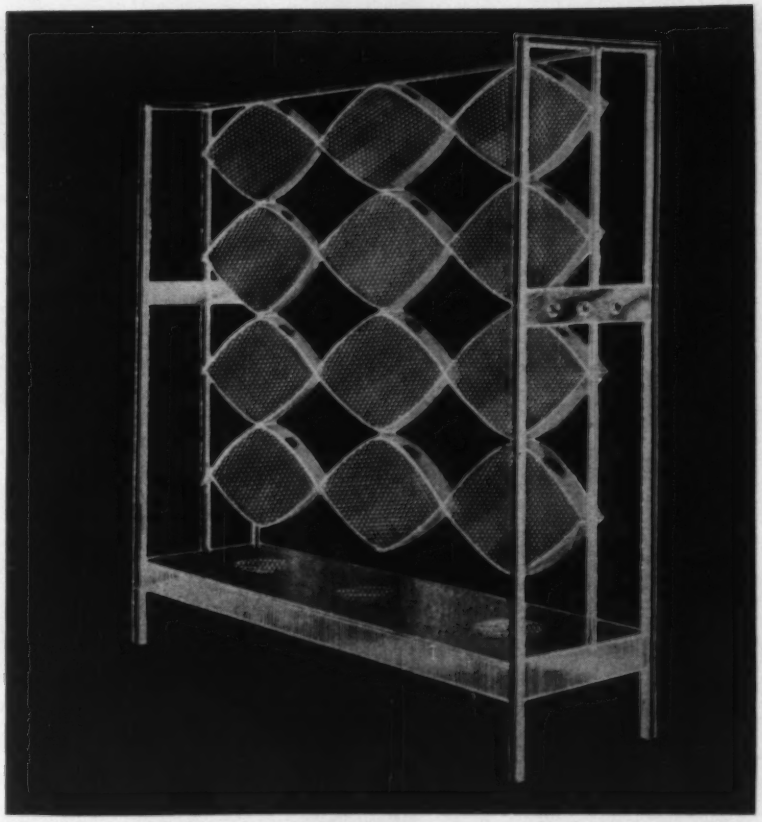
Executives who had experiences with designers contended that they were well worth the fee involved. Not from the standpoint of designing a better looking product, but as a stimulus to their own people. The designer is imaginative. He thinks. He creates. And he does all these things objectively.

Two-Way Street — Management has a few bones to pick with industrial design too. According to one executive, the outside designer seldom has the chance to follow the product through until it's in production. Company engineers often change the design to make it more "practical." This ends up in a distorted design.

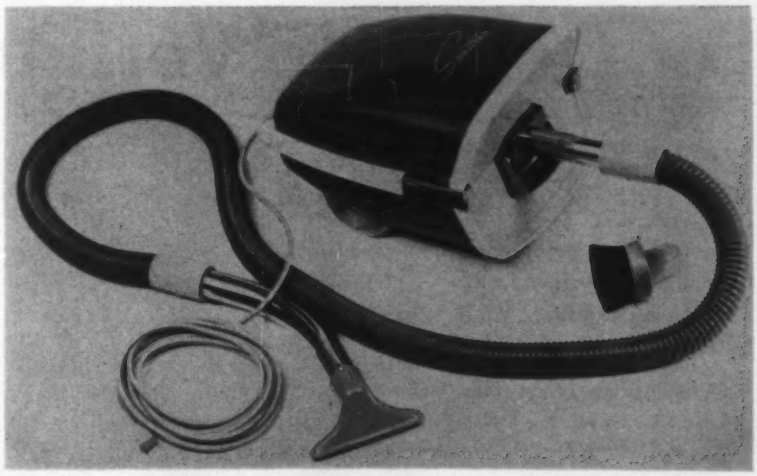
Executives agree on one point: Results would be much better if the designer could work more closely with the engineers during the critical stage of production development. But most managers don't know what the industrial designer can really do.

Listen In—It's been wisely suggested that he operate as a "design consultant." He should make a "design audit" of the company. He should look into everything from the corporate image and product design right down to how the salesman should dress. More important, though, he should carry out the recommendations that he makes.

In the markets of the Sixties, competition is going to be tougher than ever before. If your product is going to stand up to the side-by-side comparison of the trade show, design—as well as engineering—must play a vital role in your marketing plans.



AIR CONDITIONER: Design of room air conditioner is at least ten years ahead of production. Such a unit would have to operate on the principle of thermoelectric refrigeration.



THANKS TO DESIGN: Plastics and metals were combined to give this vacuum cleaner a look of high fashion, so necessary in sales.

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FOR CORROSIVE JOBS: Inside of this steel pipe is glass. It can be cut to size for piping of acids.

GLASS BOND HOLDS UP: A 5-ton weight fails to separate the two steel discs bonded by glass.

Process Bonds Glass to Steel For Designing Versatility

By **O. J. Britton**—Asst. to Technical Manager, Pfaudler Div., Pfaudler Permutit, Inc., Rochester, N. Y.

Glass is a popular choice for handling corrosive, sticky or ultra-pure products. But the breakage problem often arises.

One answer is to bond the glass to steel for structural strength.

■ The widespread use that glassed steel enjoys today stems from the traits of its two basic ingredients—glass and steel.

Glass has a number of natural advantages which make it popular with the process industries. Adding the asset of structural strength by bonding the glass to steel opens the door to industry-wide acceptance.

Uses for this versatile construction - material include reactors, dryer-blenders, columns, storage tanks, valves and piping.

Certain Advantages — How can you use glassed steel? Where will it best serve? Why is it preferred over other materials?

Glass is corrosion resistant. It is inert and thus will not contaminate. It is smooth and so sticky products do not readily adhere. It is easily cleaned and sterilized. Steel, of course, adds the all-important property of strength.

The strength of the glass-steel bond has been pointed up time and again. A certain test twisted glassed-steel strips to the elastic limit of the steel. Yet the bond and the glass remain intact.

Does Not "Run"—Of course, the material is not indestructible. Hit it hard enough with a hammer and it will chip. A nail scratches it if enough pressure is exerted. Even so, damage of this nature is limited.

Because of the interlocking chemical action at fusion temperatures, fractures will not "run" as they do

in window panes. A sharp impact causes damage only at the point of impact.

According to The Pfaudler Co., division of Pfaudler Permutit Inc., Rochester, N. Y., glassed steel, used with care, gives many years of service. "Should damage occur, repairs can be made in the field—quickly, effectively and permanently."

Design Factors — The normal maximum operating temperature for Pfaudler Glasteel is 450°F. However, practical limits can be influenced by certain factors such as chemical composition of product to be handled or the thermal shock resistance of the Glasteel.

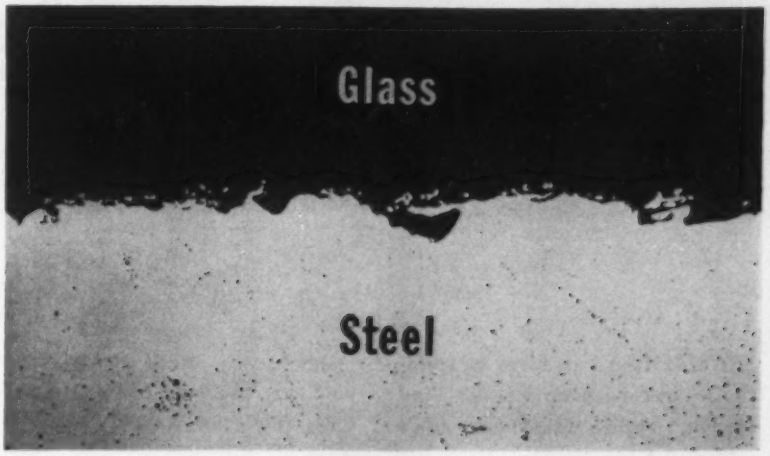
Design plays an important role. The 450°F operating temperature limit applies to standard Pfaudler reactors up to 2000 gallons. Because of the varying shapes of Glasteel vessels, stress is often difficult to predict on non-standard and larger reactors. One temperature limit will not apply in all cases.

Operating cycles are also important. Glasteel data are based on maintenance of temperatures and concentration 24 hours a day, 7 days a week. Increased downtime and operation under less corrosive condition will extend its life.

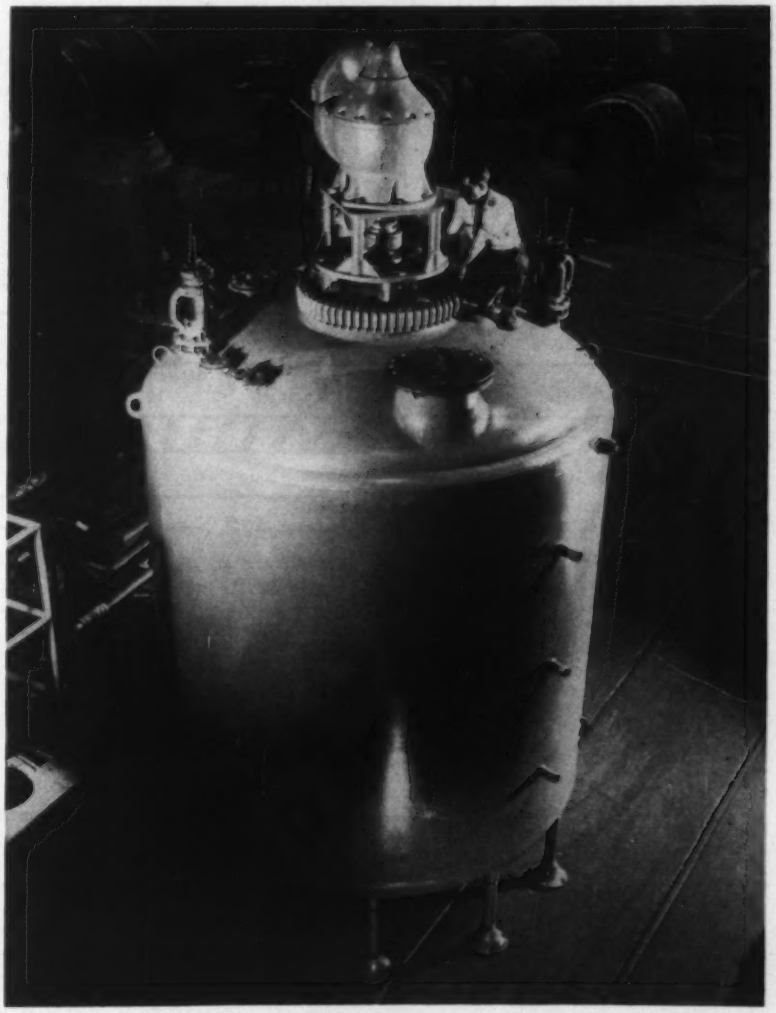
How Is It Made? — Making glassed steel is by charging a mixture of ingredients into a glass-smelting retort and fusing this mixture into molten glass. The molten batch is then poured into water. The sudden chilling causes the molten mass to solidify and shatter into small particles called "frit."

The "frit" is milled and goes through a number of steps to prepare it for application to steel. When ready, it may either be hot-dusted on steel parts, or be suspended in water and sprayed onto the steel surfaces.

Then comes red heat—to 1700°F —in large furnaces. These firing operations follow each application of glass. As many as seven firings may be needed, depending upon the final use. The result is glass—chemically and physically bonded to steel.



JOINS AT HIGH TEMPERATURES: Photomicrograph outlines physical and chemical bond produced by fusing glass "frit" onto steel at 1700°F.



GLASSES LARGE SIZES: Size of this 7150 gallon steel reactor presented glassing problems. Vessel had to be fired in upright position.

Composite-AdhesiveBondsCases For Solid-Fuel Rocket Motors

By **R. E. Stegler,** Project Manager, Missile Systems Div., Republic Aircraft Corp., Mineola, N. Y.

Welds cause stresses in solid-fuel, rocket-motor cases. And strong, rigid adhesives can't withstand elastic strains.

A three-fold process eliminates trouble spots and reduces cost and weight by 30 pct.

■ Developments of major importance to the entire missile industry—and to other metalworking firms—are currently taking place at Republic Missile Systems Div.

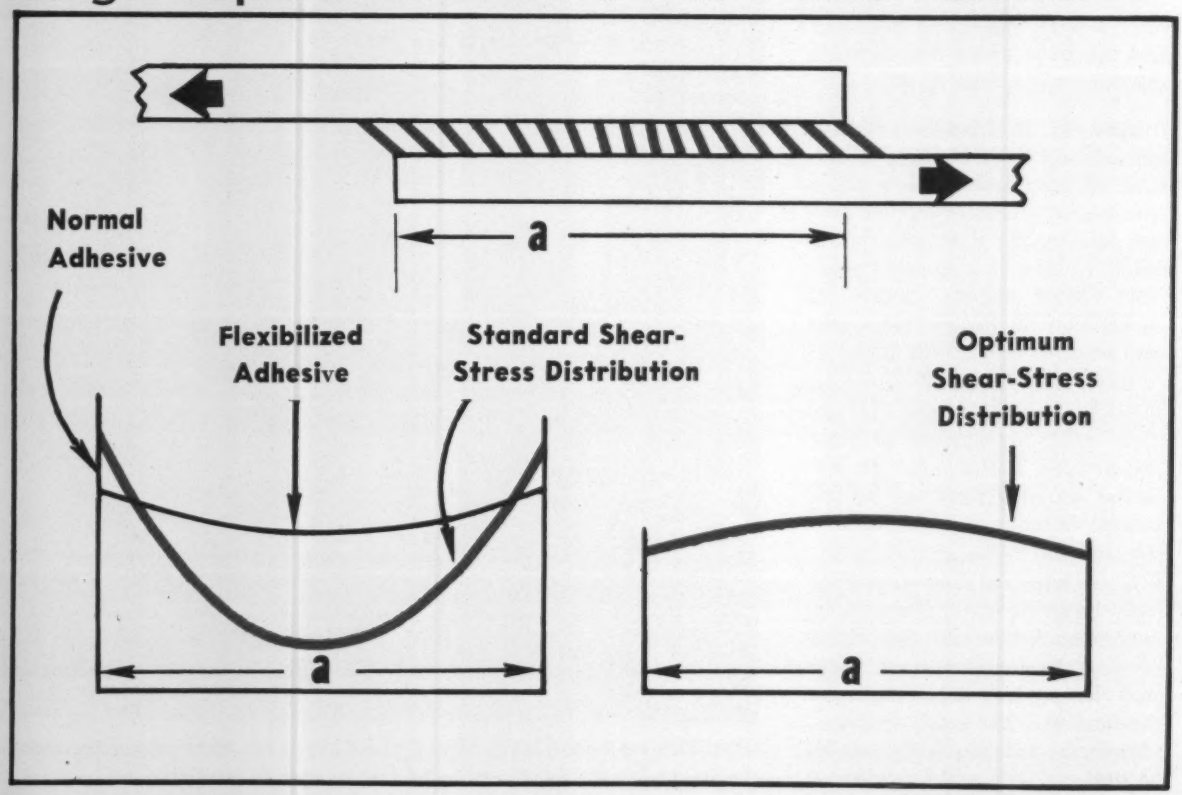
Tests prove out new design and manufacturing methods which eliminate most problems of solid-propellant, rocket-motor cases. At the same time, the new methods reduce cost and weight of the cases by about 30 pct.

In making the cases, many problems normally arise. They include: costly processing, high-reject rates, and low reliability.

Eliminate Welds—Most problems occur as a direct result of one-piece welded construction. Therefore, when Republic decided to build rocket-motor cases all efforts were aimed toward finding a better way to construct the units.

Products of this decision—and of two years of company-funded research—are the bonded-ring motor case, the quench-sizing process and the composite lap joint. To date these patent-pending processes provide a burst-stress level of 255,000 to 275,000 psi. These values are realized in vessels with a 24-in. diam and 0.060- to 0.064-in. wall thicknesses made from air-melted Ladish D6-A steel.

Single-Lap Bonds Show Shear-Stress Pattern



This new motor-case design is based on the fact that stress in the pressure vessel is twice as great in the hoop or girth as in the axial direction. Republic uses this fact to divide the case cylinder into a series of inner and outer rings.

Ring lengths range from 8 to 20 in. They are put together in a staggered, overlapping fashion. This provides a large area for joining the rings at their common interface. The overlap equals half of each ring's length or from 4 to 10 in.

Withstand Stresses — Each ring helps to carry the hoop stresses while acting independently to carry the longitudinal stress. This latter stress transfers from one ring to the next through the ring's common interface.

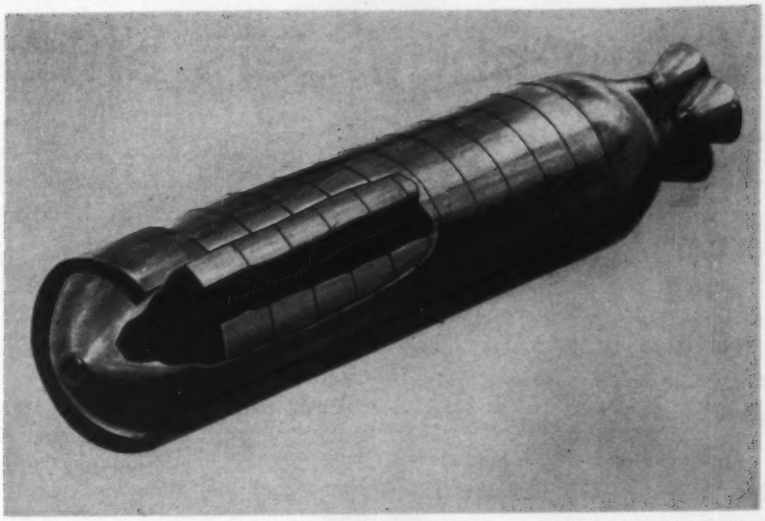
Coupled with overlapping ring design is a new quench-sizing process. Basic fabrication of the rings is not difficult. However, a tough problem centers on how to produce the rings to accurate shapes with high-strength levels. Good strength is available through heat treating, but warpage also results.

Quench-sizing supplies the high-strength without warpage. This process involves placing a prefabricated, annealed and undersized ring around a collapsed, expandable mandrel inside a set of induction-heating coils.

In from 30 to 90 seconds the coils heat the ring to its austenitic temperature. After a short dwell period, the mandrel is activated. The mandrel expands the ring to its finished size. At the same time, the mandrel's heat-sink mass quenches the ring. Use of this method insures accurate, high-strength rings.

Decide Assembly—Selection of a joining method was not an easy decision to make. The large overlap areas are ideal for spot welding. And a long-standing prejudice against "glue" tended to preclude the use of adhesive bonding.

Fortunately, two factors resulted in a decision to check out the latter system. Sharp notches are created at the interface surrounding a spot weld, and welding imposes limits on the selection of materials for use at high-stress levels.



MOTOR CASE: The case cylinder consists of a series of inner and outer rings. These rings are bonded in a staggered, overlapping fashion.

To assemble the rings with a 0.005-in. glue-line gap between them, Republic first chose Epon 901 as a bonding agent. This adhesive is a high-strength, wet resin which is mixed and applied in paste form.

Double Trouble—Tests show two trouble sources. One consists of the problem of keeping air out of the joint. The other factor is harder to explain. It hinges on the fact that all failures are peel-like in nature. This is not expected in a pure-shear field.

At this point it was decided to use a dry adhesive to prevent air entrapment. The adhesive selected for the test was Shell 422. It produces lap-shear bonds even stronger than Epon 901.

But under hydrostatic tests, failure again occurred in the joint—at 400 psi. This value is much lower than that obtained with the wet resin and the failure is again peel-like in nature.

All variables had been checked out. It was noted that the stronger adhesive develops the lower strength in the long lap joint. This proved the turning point.

Detailed studies and more tests led to the conception of the program's most important development —the composite-joint.

Offer Theory—As adhesives are made stronger they also become more rigid or brittle. This is a natural result of their low elastic modulus. This fact doubled with the lower test performance led to the conclusion that failure of long lap joints in high-strength materials is a function of strain rather than stress.

Use of the theory led to the selection of another dry adhesive. Another vessel of the test series was assembled using Bloomingdale FM-47. It withstood 1290 psi prior to failure. It also failed in the joint. But it did not peel. For the first time failure was cohesive in nature.

This fact, coupled with a 0.1 pct permanent deformation of the parts in the joint area indicates that the bond follows the steel's elastic deformation.

Composite Joint—Greater advantage of non-uniform strain in the lap joint is realized by placing a strong (rigid) adhesive at the center where shear strains are the lowest. Progressively weaker (and more flexible) adhesives should be applied toward the edges of the joint. By following such a concept the stress distribution curve can be inverted to increase joint strengths by factors of two or three.

Value Engineers and Designers Team Up to Reduce Costs

By L. J. Marcon—Manager, Value Engineering, Government and Industrial Group, Philco Corp., Philadelphia

Everybody knows that costs are going up. But what is being done about it?

One answer is value engineering, a design and function-centered approach. Result: cost reductions on the order of 30-50 pct.

■ One of the greatest challenges faced by industry and government today is how to combat rising costs. The government is finding military equipment more and more complex and costly. Industry faces rising labor and material costs, and increased competition.

Cost reduction programs are quite common. Goals are familiar. They run the gamut of limiting telephone calls and conserving paper to the more sophisticated measures conducted by trained cost-engineering analysts.

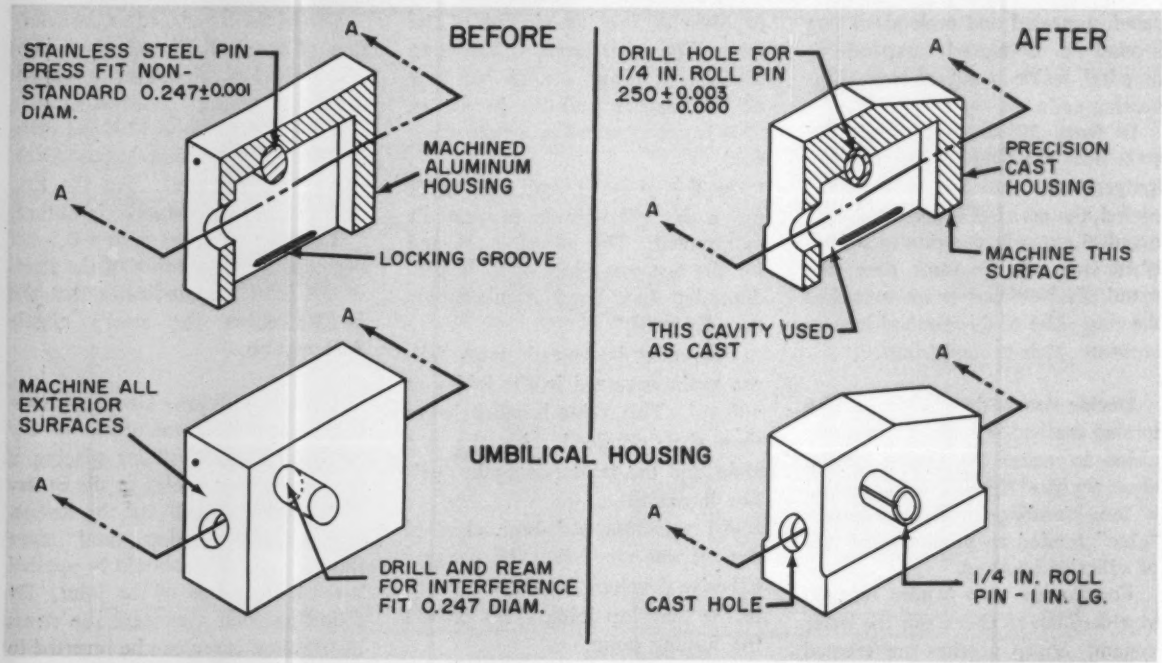
One of the most effective approaches is that of "value engineering." Results are often far more reaching than long established cost-reduction techniques. Cost reductions on the order of 30-50 pct and greater are common. And a potential of two to three equipments for the price of one is possible.

New Approach—Value engineering is a rather new and advanced approach to overall cost reduction. It appeared on the scene within the past few years and is growing rapidly.

There have been other names for this activity, such as value analysis, value improvement, value control, and value assurance. But the most common terms are value engineering and value analysis. The first is associated with development of a design, while the second is a review of established design.

Note that the emphasis is on

Improved Design Permits Casting


BEFORE
STAINLESS STEEL PIN PRESS FIT NON-STANDARD 0.247±0.001 DIAM.
A
MACHINED ALUMINUM HOUSING
LOCKING GROOVE
MACHINE ALL EXTERIOR SURFACES
DRILL AND REAM FOR INTERFERENCE FIT 0.247 DIAM.
AFTER
DRILL HOLE FOR 1/4 IN. ROLL PIN .250 +0.003 -0.000
PRECISION CAST HOUSING
MACHINE THIS SURFACE
THIS CAVITY USED AS CAST
UMBILICAL HOUSING
CAST HOLE
1/4 IN. ROLL PIN - 1 IN. LG.

CAN IT BE CAST?: Before the housing was value engineered, the entire part was machined from bar stock. After redesign, part is now precision cast; needs only minor machining. Cost reduction: 35 pct.

value. It can be defined as "the lowest cost for a product consistent with the requirements of performance and reliability."

Many in industry are quite certain that they have been performing value engineering all the time under a different name. Many feel that it is an art or a philosophy while others state that it is a science.

Other Systems Differ — Despite these feelings or opinions, a close study of the steps involved in value engineering will disclose basic differences from other cost-reduction systems.

Standard techniques of production and industrial engineering, methods and tool engineering, time and motion study, motion-time method and similar approaches for achieving job improvements and lower costs, have one thing in common; they are methods centered.

Efforts are confined mainly to the manufacturing and purchasing realms. At times, they encroach into the design realm to make sure production problems won't crop up.

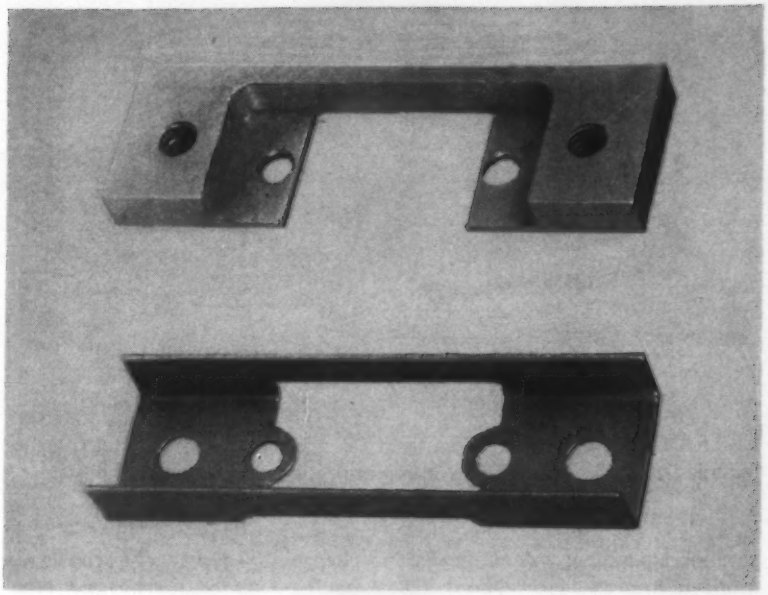
Stresses Design—How does value engineering differ from cost engineering? The answer is that value engineering is design and function centered.

First, the basic design of a part, assembly or equipment is determined. It is then checked for possible simplification and modification.

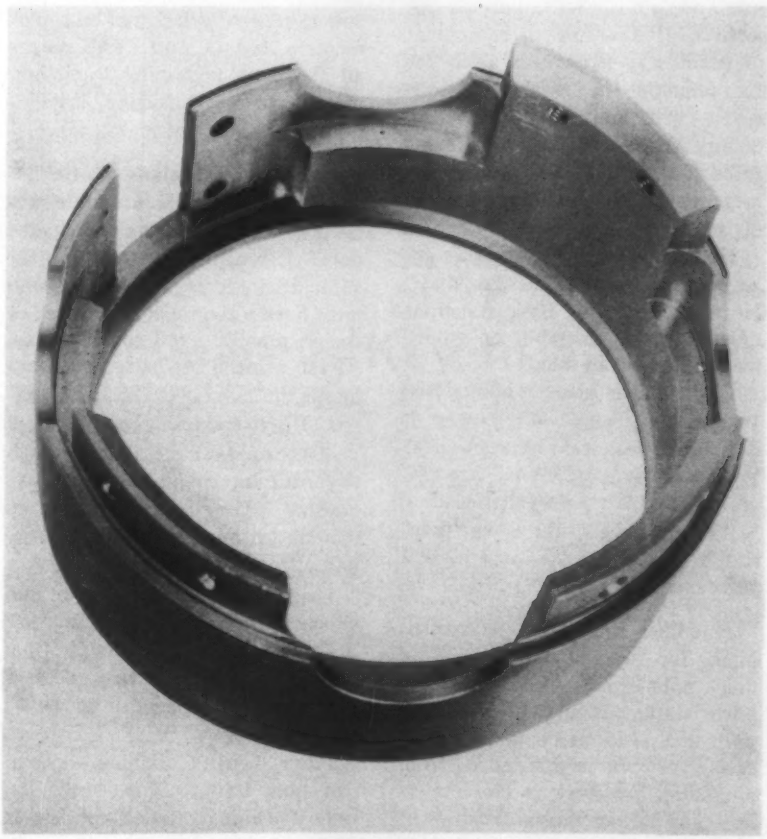
The purpose? To lower cost of achieving a design function, in addition to reducing manufacturing and field operation costs.

Consider this case. The specifications for an aluminum missile tail fin called for a 32 microinch finish on all surfaces. Of course, this involved high machining costs. It also posed a problem for the quality control and inspection teams.

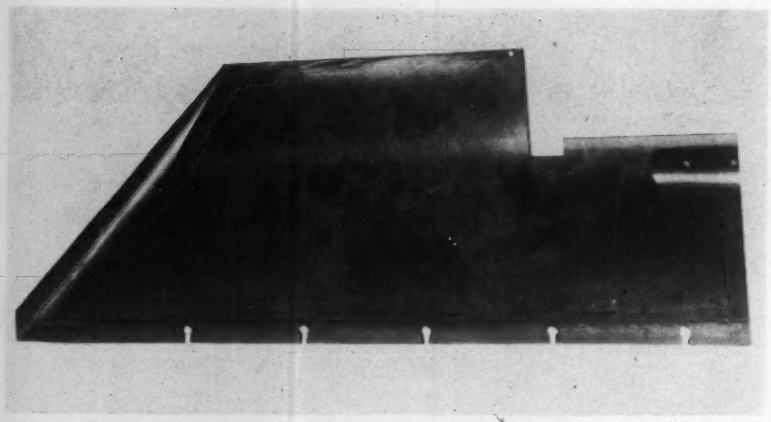
Finally, the base specs were challenged. It was discovered that the finished fins received two coats of paint; even a 125 microinch finish would not impair the aerodynamic function of the fin. Result: the specs were eased; the need for costly in-



TRY STAMPING: Restudy of function shows machining steps (top) to be unnecessary. Stamping of part instead of machining cuts cost 80 pct.



IMPROVES RELIABILITY: Changing the tolerances in the housing permits use of impact extrusion technique rather than machining, and an improved alloy. Results: 50 pct savings; 25 pct greater yield strength.



CUTS COSTS: Easing of specs from 32 microinches to 125 microinches for missile tail-fin finish means lower inspection and fabrication costs.

spection equipment was eliminated; fabrication costs were reduced; rejections due to surface finish are almost nil.

Has Two Aims—Value engineering is concentrated at the design level. It fulfills two important objectives. It develops an equipment or product to perform a given design function—at the least cost consistent with suitable performance, quality and reliability. And it assures that further design improvement is doubtful within the state of the art.

Here is how a value engineer approaches a product design study. He first checks the basic functions of each part, assembly or equipment with cost in mind.

Each item is given this analysis: What is the item? What must it do? What does it do unnecessarily? What does it cost? What else will do the job? What does that cost?

These steps give the lowest practicable production cost and highest value per dollar.

Simplifies the Part — The small plate, for example, shown in the first photograph, looks like a fairly simple design. The plate supports and positions a small electrical connector. It is machined from aluminum bar stock to close tolerance and surface finish.

After studying several fabricating methods in regard to the basic function of the part, it was decided to change the design. The holes do not have to be tapped and other features are not needed. This permits the part to be stamped rather than machined. Result: 80-pct cost reduction.

The value engineer must also be able to relate the design of an equipment to its total cost. This means all the costs pertaining to design, manufacturing, packaging, installation, operation, and maintenance.

Ask These Questions—Is the design feature essential, desirable, unnecessary or is it just an appearance item? It becomes apparent that the value engineer is a specialist who most have a thorough knowledge of design practices and specifications. At the same time, he must always be on the lookout for better methods of performing a given function.

Take, for example, the case dealing with an umbilical disconnect housing. The drawing points up manufacturing techniques before and after value engineering.

Original procedure was to machine the housing to specifications; drill and ream a hole for a pin (that had to be ground because it was a non-standard size); finish up with a milling operation.

After slight redesigning, the part can now be precision cast. The only machining needed consists of drilling a hole for a standard split pin, and milling the base flat. Neither reliability nor function is impaired; cost reduction is 35 pct.

Team of Engineers—As a rule, value engineering is performed by a team of engineers, each a specialist in a specific field. Thus, a good team on electro-mechanical equipment could comprise: a mechanical engineer and an electrical engineer, each with design experience; one or two industrial or production engineers, familiar with fabrication and tooling techniques, and cost analysis.

Such a team can do an evaluation job that will leave no stone unturned in arriving at the lowest cost for a stated function.

Other important by-products of value engineering, not wholly measured in dollars and cents, are ease of producibility and greater reliability. Although the value engineer does not guarantee greater reliability, he does improve it more than 50 pct of the time.

In any case, reliability will be maintained. He knows that the simpler a design to achieve a given function, the more producible and reliable it becomes.

Calls for Machining—Take the case of the cylindrical housing shown in the photo on the previous page. The housing was formerly machined from 2024-T3 drawn aluminum tubing. It required turning on a turret lathe followed by milling the four pockets.

A study of the tolerances in regard to part function showed that the pockets were cut out only for clearance; close tolerances aren't needed.

Then why not simplify the machining steps and use the impact extrusion technique? This is the procedure now; cost reduction is 50 pct; and use of an extrusion aluminum alloy, type 2014-T6, increases reliability by giving 25 pct greater yield strength.

There are a number of similar case histories which can be cited. Needless to say, more and more companies are getting on the bandwagon. Value engineering is here to stay.

What Design Factors Are Vital To High-Temperature Plastics

By **J. D. Flynt**—Exec. Asst. to the Pres., and **D. C. Biedenkapp**—Chemistry Mgr., CTL, Div. of Studebaker-Packard Corp., Cincinnati

There are a few added wrinkles in working with heat-resistant reinforced plastics.

It pays to know how to specify correct design practice to avoid costly revisions.

■ Heat-resistant reinforced plastics, such as glass fiber or artificial quartz reinforced phenolics and phenyl silanes, play an important part in the expanding missile and air space industry. With such a rapid growth in use, there's a severe shortage of engineering knowledge in reinforced plastics.

Designers who are relatively unfamiliar with these materials find themselves frequently having to incorporate them into designs. Reinforced-plastic components employing accepted practices used in metal design often give birth to parts which either will not function or cannot be made.

Design Right from Start—It's a well known fact that attempts at redesigning a particular component may create a chain reaction, forcing the virtual redesign of the entire missile. Therefore, reinforced-plastic design must be proper at the very outset.

A common area of misconception by designers is the part played by reinforcement. Reinforcement provides virtually all of the strength of the composite. The resin acts to hold the reinforcement in place.

The resin can, in effect, be considered the limiting factor of the composite. A good resin permits the designer to realize more of the potential strength of the fiber reinforcement; however, it adds little to the strength of the composite.

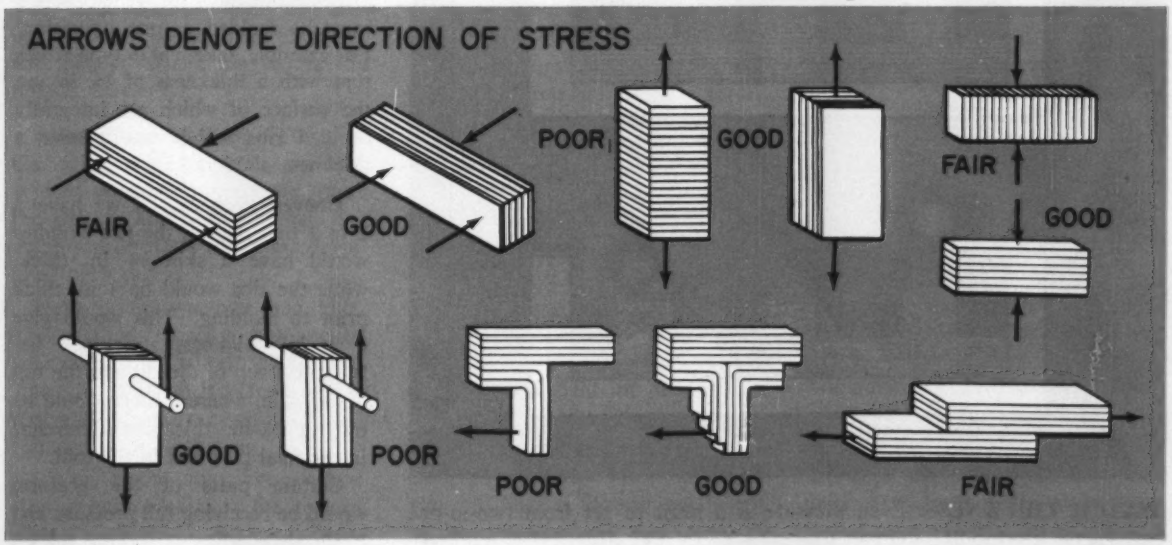
Orientation Is Vital—In any design it is an absolute necessity to maintain orientation of the reinforcement. A wrinkled fiber might as well be considered no fiber at all with respect to stress loading the part. The part has optimum mechanical properties only in parallel directions to its reinforcing fibers.

Take the case of a laminated structure employing a reinforcement with about equal numbers of fibers in two principal directions normal to each other. It will have maximum strength in those directions.

But it will have relatively poor strength in bias directions. Any part which may be loaded in a bias direction should be designed using bias direction properties, not those of the principal directions.

No Stretch — Another facet is that the materials are not elastic and thus cannot be stretched infi-

Orientation of Laminate Is Key to Strength



nitely over complex contours. A glass, quartz or asbestos fiber will bend, but it will not stretch.

The weave of glass cloth most commonly used in aircraft structural parts is woven to provide a stretching effect. It can, for example, be stretched around a 3- or 4-in. radius almost to a complete hemisphere.

Tailor to Contour — When the limits of weave distortion are surpassed, it becomes necessary to tailor laminations to the proper contour. Tailoring involves the cutting of fibers with some sacrifice of properties.

The effect of such fiber cutting can be minimized if the locations of cuts in successive layers of cloth are not adjacent to each other. However, many designs will not permit great flexibility in location of tailoring cuts.

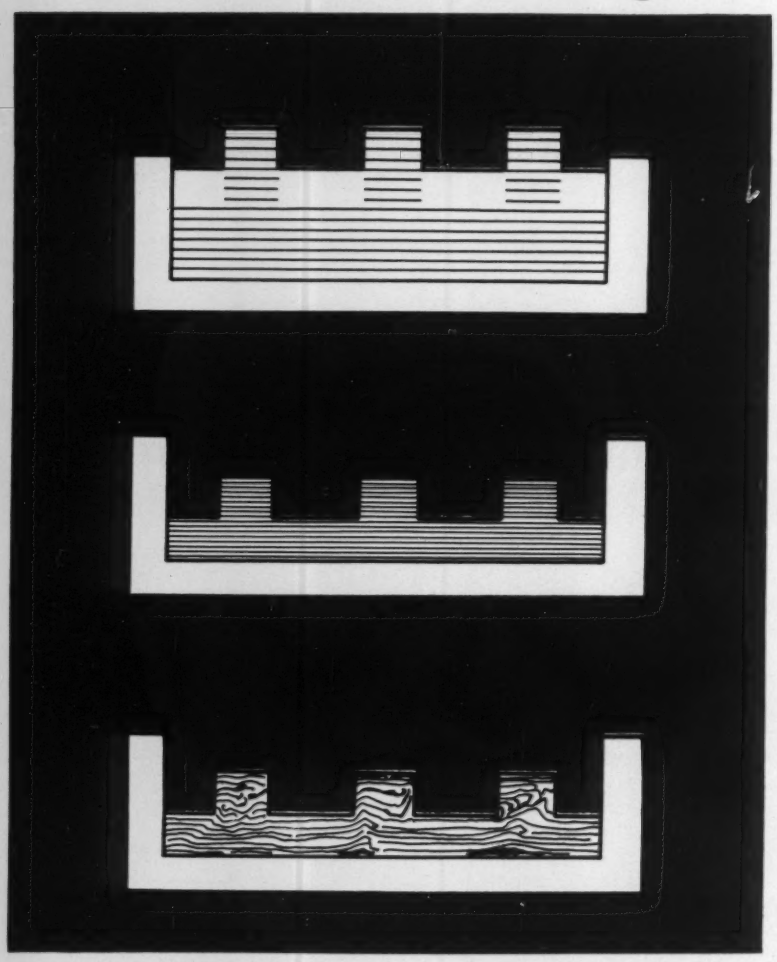
Another common error is failure to recognize that a laminated structure is a series of sheets of finite thickness bonded together. In designing, the part should be thought of in terms of a series of layers making up final thickness.

Integrate With Base—Any outrigging structures which are to be made integrally must be formable from the same basic laminations which make up the major structure. It is quite common to see designs of a skin-type structure with flanges going out in two directions at the end of the skin, both flanges being full thickness of the main skin itself.

This can't be done without adding laminations which will not be intimately tied to the fibers of the main part of the structure. The same is true with addition of bosses and flanges, because their addition often will be at a strength sacrifice over that which might be expected with a comparable metal design.

A vital area of concern for designers is the "bulk factor" of the raw material. The reinforcement has a greater thickness as a raw material than it does as a finished molded part.

Stress Bulk Factor in Design



WATCH THICKNESS: Even pressure is a must to get from two-to-one bulk factor (top) to finished part (center) without poor distribution (bottom).

Reduce During Molding—As an example, the laminations required to press mold a ⅛-in. thick phenolic laminate will be more than ¼-in. thick before pressure is first applied. During the molding cycle the thickness gradually reduces to the proper ⅛ in.

There are many preforming techniques for reducing this bulk factor down to perhaps 1½ to 1 prior to the molding operation. However, in no case can it be reduced to 1 to 1, more likely it will be as much as 2 to 1, or even greater.

Probably the most common design error relative to bulk factor involves parts that have sections with extreme thickness differences which must be molded as one operation. For example, take a skin type structure with a thickness of ⅛ in. on the surface of which are integrally molded ribs which would have a thickness of ½ in.

Uneven Pressure—If we have a 2 to 1 bulk factor, the raw buildup would have a skin ¼ in. thick, while the ribs would be 1 in. thick prior to molding. This would give a ¾-in. thickness difference between the top of the rib and the top of the skin, whereas there would be only a ⅜-in. thickness difference in the final part and in the tool.

Certain parts of the preform would be receiving full pressure and heat, while other parts were receiv-

ing no pressure at all and only a moderate amount of heat. This results in fiber wrinkling and raw material moving from its proper location to a place where it is not wanted.

If the part must be made as one piece, you have to provide an extremely expensive tool with auxiliary plungers and pressure systems to get all portions of the part under pressure at one time. The two most reasonable alternatives are to mold the panel to the full thickness of the ribs and machine out the thin areas later, or mold the panel to only the skin thickness and bond the ribs in place later.

Press from Inside Out—A second area where bulk factor often causes difficulties are developed on a radius. The bulk must always be reduced from the axis toward the periphery.

If, for example, it's necessary to make a cylinder by winding cloth convolutely on a mandrel and applying pressure from outside, the outer circumference of the bulk material will be greater than that of the finished molded part. This causes wrinkling of the fibers and resulting loss of strength. Such an article should be made with pressure applied from the inside-out.

Still another area is in the need for understanding of the types of tooling and curing methods for heat-resistant reinforced plastics. Four basic types of tooling and curing processes are used on phenolics and phenyl silanes for use in the missile industry.

Select Your Methods—The first, the cellophane wrapping method, is used only on components where the stresses are quite nominal. It's employed on parts which are developed on a radius.

Next is the vacuum bag cure. This method is used in conjunction with either the male or female tool. The raw material is placed on the tool and the entire assembly is surrounded by a membrane.

Third, is the autoclave method. This is quite similar to the vacuum curing method, the difference being that the vacuum is augmented by perhaps as much as 150- to 200-psi external chamber pressure.

BONDING FOR STRENGTH: In conical shape made of phenolic glass laminate, stiffening ribs are bonded to skin after the molding operation.

For Best Properties — Final method is matched die molding. In this case the part is molded in male and female matched tools in a hydraulic press under as much as 2500 to 3000 psi.

The four methods have been given in order of least expensive to most expensive and also in order of poorest properties to best properties. When designing a component, the designer should have some idea of the general type of tooling and processing which will be employed in making the part.

For structural components one of the most frequent design errors made is failure to consider the thermal coefficient of expansion of components which are to be used in conditions of heat. Reinforced plastic parts are rigid, not elastic, and they have very definite thermal coefficients of expansion which must be accounted for in any design.

Watch Orientation—Further, the thermal coefficient of the plastic component varies with the orientation of the reinforcement. A glass-cloth phenolic laminate, for example, will have a thermal coefficient of expansion about the same as that of aircraft grades of steel within the planes of the laminations of cloth. However, perpendicular to these planes, the thermal coefficient will be about four times greater.

Another potential area of error in the design of those structural components has to do with external reinforcing. There is a tendency to reinforce laminated structures in the same manner which similar metal parts might be reinforced.

While in many cases these methods might work out very well, in other cases they can actually produce weaker parts than if no reinforcing were used. This occurs when surface laminations are curved or corrugated to provide bulk-out areas which serve as ribs.

Study Attaching Methods — In attaching metal components, the general problems seem to take two extremes in direction. Designers tend to either employ the same methods of attachment that would be used in a metal design without alternation, or attempt to invent some new way of attaching things merely because they are dealing with reinforced plastics.

Actually, the optimum lies about half way between. There are a number of attachment methods which work very well with most reinforced plastic forms.

Can Designers Meet Demands Of Ultra-Low Temperatures?

By W. K. Sutton—Section Engineer, Cryogenic Products Dev. Lab., Linde Company, Tonawanda, N. Y.

The increased use of ultra-cold liquid gases poses many problems to the designer.

Among them: How do metals react? How can these cryogenic fluids be handled? Here are some answers.

■ Cryogenic fluids, such as the gases of the atmosphere in liquid form, are the focal point of intense research and development activity in many industries today.

Interest in certain processes which involve sub-zero temperatures has been expressed by people in such diverse fields as steelmaking, chemical processing, missile propulsion, and designing of electronic devices.

But how does one store and handle cryogenic fluids? What materials are best for making up the containers, piping and equipment for these ultra-cold fluids, and the insulating systems to enclose them?

These are problems which have been faced by designers of equipment for cryogenic fluids. To solve them, the scientists and design engineers have worked together.

Braze for Safety — The most widely used material for early low temperature work was copper. Its formability and ease of making joints with soft solder and by silver brazing made it a natural choice.

Aluminum alloys are also attractive for making equipment for low-temperature service. All the alloys, as well as pure aluminum, are ductile at low temperatures. Also, they are non-corrosive and easy to fabricate.

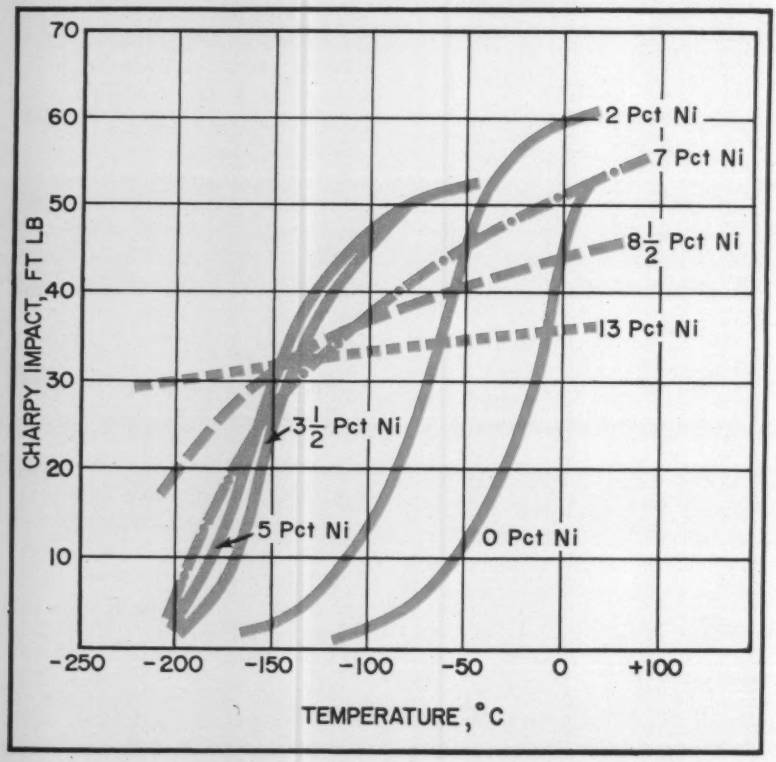
For the welding of aluminum, there are now standard procedures which ensure sound joints. New weldable alloys such as 5154 with an ultimate tensile strength of 30,000 psi make the picture more favorable. Newer alloys with 40,000 and 42,000 psi ultimate strength further brighten the future of this metal.

Try Stainless Steels — Austenitic stainless steels are excellent for low-temperature work provided the steels are kept in the austenite state by proper heat treatment. Composition, such as low-carbon content, is also a factor. Otherwise, the low-temperature toughness of the metal may drop.

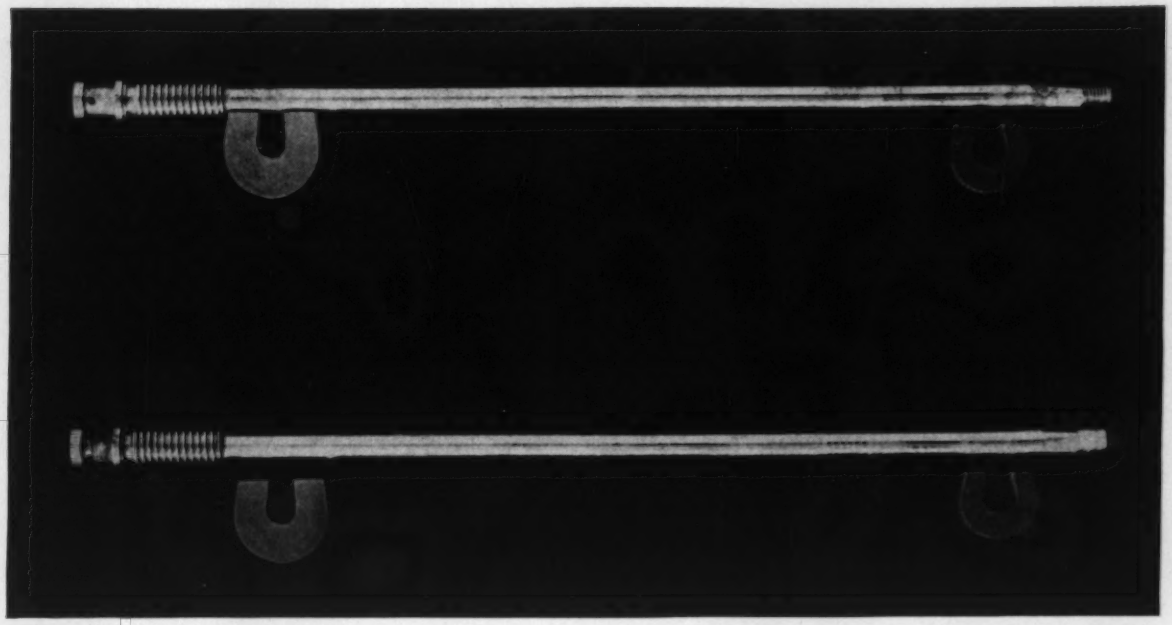
How about stainless steel welds? Constant effort must be made to ensure welds of satisfactory ductility. Thus, an alloy with high carbon content such as AISI 302 should not be used.

Does it Transform?—The question arises: Does austenite in stain-

Nickel Improves Impact Values



LOWERS TRANSITION RANGE: Increasing nickel content moves the ductile-brittle transition temperature to lower and lower values.



ATTRACTED BY MAGNET: One end of the valve stem (top) had been exposed to liquid oxygen temperature for several years. Attraction to magnet points up that some austenite transformed to martensite.

less steel transform to martensite after long exposure to very low temperatures?

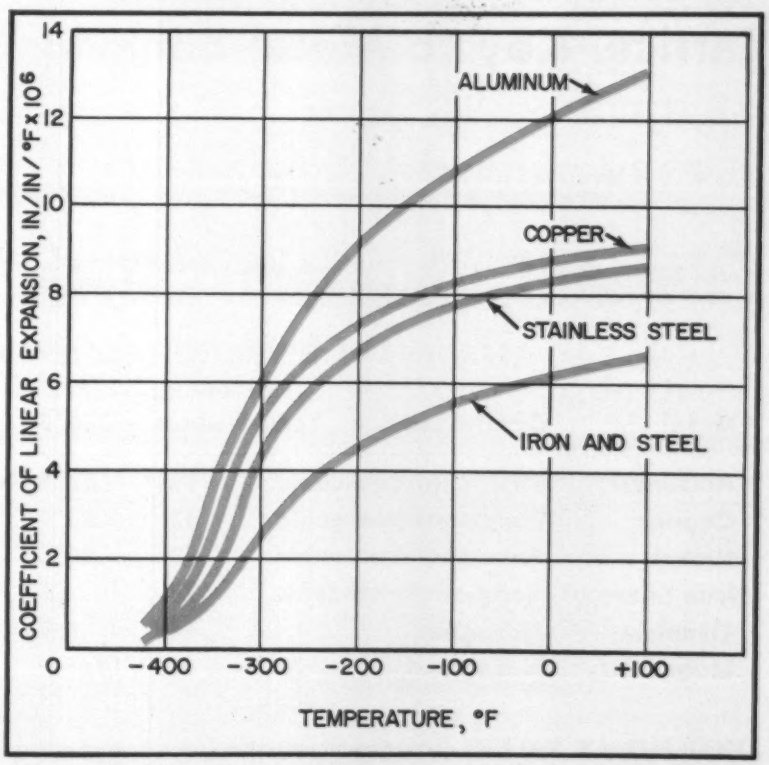
Of the two valve stems shown in the photograph, the upper one had been in liquid oxygen service for several years. (The bottom one serves as a comparison.)

Actually, only one end of the valve stem was exposed to liquid oxygen temperatures. This is the end that is attracted to the magnet. It points out that there was some transformation of non-magnetic austenite to magnetic martensite. But while this change can take place, there are no known failures that have resulted.

Check the Lattice—There is a rule of thumb that can be helpful in designing for low temperatures. It concerns the crystal lattice structure by which metallurgists group metals.

Generally, those metals which have a face-centered-cubic lattice (see drawing) such as aluminum, copper and nickel show no loss of ductility at low temperatures. Members of the body-centered-cubic class such as iron—and of the hexagonal-close-packed class, such as titanium and magnesium—show a

Properties Vary at Sub-Zero



LESS EXPANSION: Change in coefficients of linear expansion due to low temperatures calls for revised planning on part of design engineers.

marked tendency towards brittleness below a certain "transition temperature range."

Of the body-centered metals, iron and steel are the most common and the most generally used for building. However, the metal must be specially alloyed for use at ultra-low temperatures. And, for most jobs, this means heavy alloying.

Nickel Affects Strength—The first chart depicts the effect of alloying steel with varying amounts of nickel. Note that the transition range moves to lower and lower temperatures with greater nickel content. Also, the residual ductility is somewhat higher.

When the nickel content is raised to 8.5 pct, the transition temperature drops below —320°F. This alloy is well suited for most cryogenic work.

Vital Pointers—What are some of the factors to consider in the handling of cryogenic fluids?

The design of piping for sub-zero service does not differ greatly from that at elevated temperatures. Calculations for flexibility are made in the same manner. But remember that the movements are contractions and not expansions.

These contractions will affect the way in which to support and anchor the piping. Supports of hangers should be placed so that there will be a minimum of heat-gain by the fluid in the pipe. This means placing, for example, insulated blocks between the pipe support shoe and the steel or concrete support.

Beware of Ice—For pipe hangers, the pipe attachments should extend past the insulation far enough so that ice formation will not affect hanger operation.

The flange bolting will not be too great a problem so long as the bolting and flange contract a like amount. If possible, the bolting should be of the same or like material as that of the flanges.

Gasket material can vary widely. It depends upon the service temperature and the fluid. You can take your choice of aluminum, copper or stainless steel gaskets. They are all serviceable at —320°F.

Welding Raises Problems—There are certain points to remember when welding ferrous metals for sub-zero service. Such factors as dissolved gases, variations in base and weld metal, heat affected zones, and undercut welds enter the picture.

Dissolved gases may be lessened by using low-hydrogen, covered electrodes or submerged arc welding.

Using electrodes of a material not compatible with the base metal may set up stresses. They are due to the difference in expansion of the two metals—especially in thick walls.

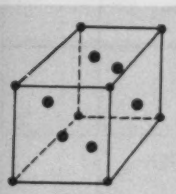
Take care that ferritic base materials are not welded with austenitic electrodes. A brittle fusion zone may result because of dilution of the austenite weld metal.

Cryogenic Insulation—This may be of several materials and types depending upon the service temperature and other conditions. Very high quality insulations recently developed for ultra-low temperature service consists of mixtures of powdered copper and/or aluminum with a material such as perlite, or multiple shields of alternate layers of aluminum foil and glass-fiber material. Both insulating systems require that the material be maintained under very heavy vacuum.

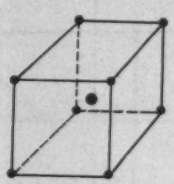
Safety protection must be provided in those line handling cryogenic fluids such as liquid oxygen and liquid hydrogen. Vaporization of the fluid, due to heat leak in an isolated section of pipe line, may occur. The capacity of the safety valve required in such a section of line may be readily calculated from the heat leak through the insulation.

Also, trapped pockets of the cold fluid, such as in the bonnet of gate valves and plug valves must be provided with some means of relief against a build-up in pressure which could otherwise rupture the valve body.

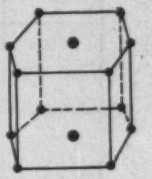
Lattice: Key to Metal Behavior



BODY CENTERED CUBIC LATTICE



FACE CENTERED CUBIC LATTICE



HEXAGONAL LATTICE

Metal	Crystal Lattice	Energy to Break, ft-lb: Room Temperature	Energy to Break, ft-lb: −320°F
Aluminum	Face-centered-cubic	19	27
Copper	Face-centered-cubic	43	50
Nickel	Face-centered-cubic	89	99
Iron (Armco)	Body-centered-cubic	78	1.5
Titanium	Hexagonal	14.5	6.6
Magnesium	Hexagonal	4	(3 at −105°F)

ALTER IMPACT VALUES: Note that impact strength of face-centered-cubic metals improve at ultra-low temperatures. Values for body-centered-cubic and hexagonal-close-packed metals show a decrease.

AGAIN-

Shown here is the 6" Rapidaytor Dolphin Submersible Pump, one of a complete line of 4" and 6" pumps made by THE TAIT MANUFACTURING COMPANY, Dayton, Ohio. Arrow points to the upper body shell made of Revere seamless leaded brass tubing. Hand holds the diffuser casing made of Revere Brass Strip and used inside pump.

Revere helps "fit the metal to the job"

AND A PUMP MANUFACTURER FABRICATES SUPERIOR PARTS WITH GREATER EASE . . . INCREASES TOOL LIFE

An important part of the submersible pumps made by Tait Manufacturing Company is the brass diffuser casing you see above. This part had formerly been made of ferrous metal. While satisfactory as a pump part it was difficult to work and draw . . . at the same time tool life was short.

One of Revere's Technical Advisors was asked to study the problem. Revere Cartridge Brass Strip of a certain temper was recommended, samples submitted, and, after extensive tests, was approved. The customer has found that not only does the diffuser casing, made of Revere Brass, perform well in the pump, but it also has superior drawing properties, is more easily worked, and tool life has been substantially increased.

This meticulous attention to "fitting the metal to the job" also resulted in Tait Manufacturing Company's specifying Revere seamless leaded brass tubing for the upper body shell of its submersible pumps. Here the application called for extremely close straightness and roundness control which meant special attention to detail on the part of the Revere mills.

Why not put the extensive knowledge of Revere's T.A. Service to work for you? With the wide variety of metals at your disposal, perhaps Revere can help you select the one best suited for the job, with a resultant saving of money while improving product quality.

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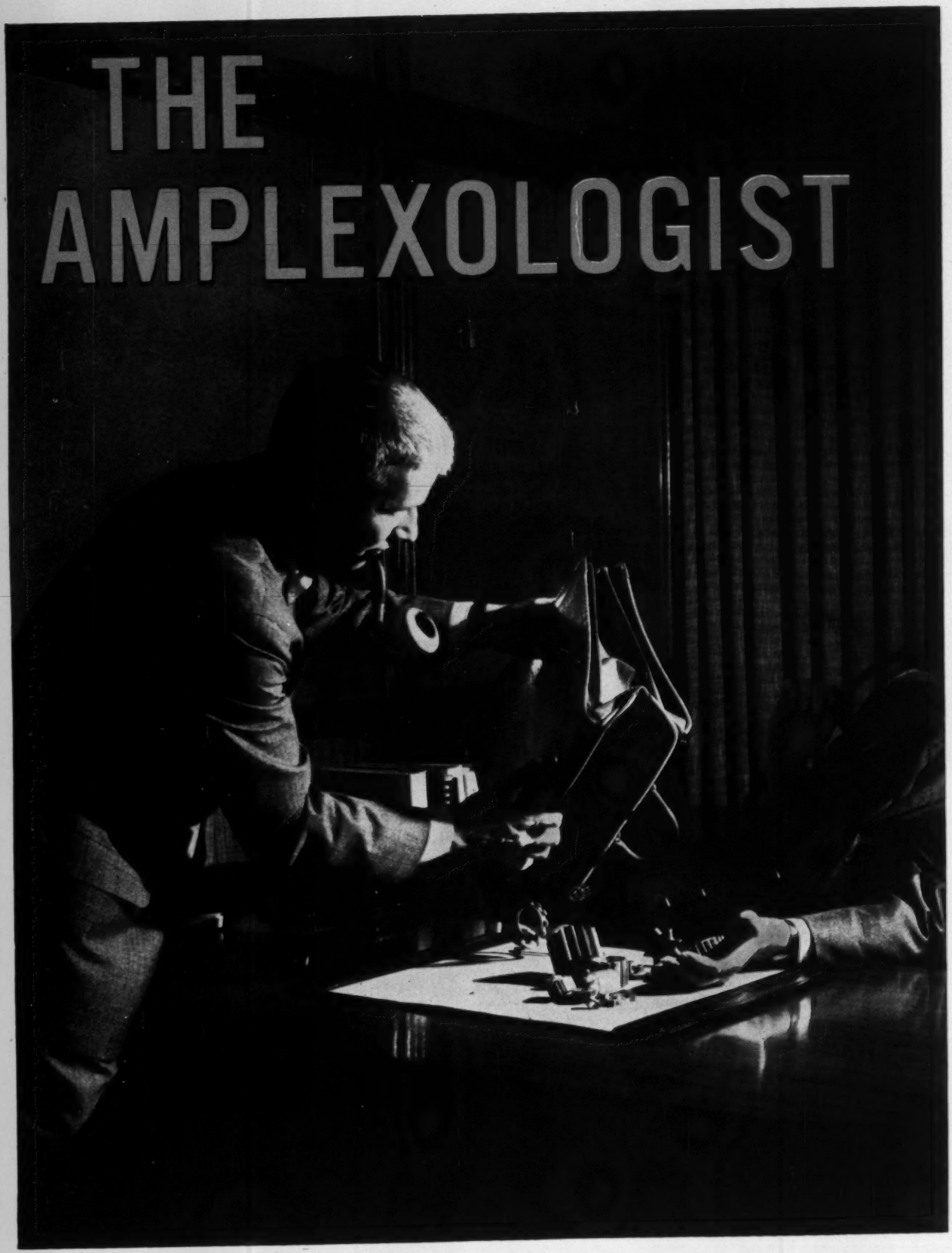
THE AMPLEXOLOGIST

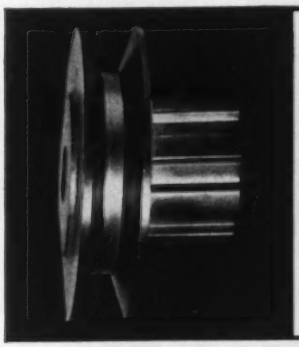


The Amplexologist is not adverse, at times, to using a little hard sell. Especially when he's talking to a hard-headed prospect. Like the manufacturer whose ideas about powder metallurgy seem to be based on information he picked up second hand in, maybe, 1935. The Amplexologist, you see, resents being told—*"It won't work, it can't be done"*—when he's doing it.

Ergo: Dump a few hard facts in the man's lap.

For example: pulleys, sprockets, cams, gears . . . in dozens of combinations of sizes and shapes. Parts that "couldn't be made" out of powder metal. Parts that Amplex—with new techniques, new alloys, advanced density control—*is* making today. Take a look!

Well, credit where credit is due. Most manufacturers, we're happy to say, are ready to revise their ideas after the Amplexologist submits the facts. Their openmindedness has saved them thousands of dollars. They like that. We like it, too. It has helped make us the world's largest and most experienced producer of powder metal parts. It's one reason so many manufacturers say: **When it comes to powder metallurgy—Amplex has the answer.**



LIKE TO LOOK AT A FEW HARD FACTS YOURSELF?

The part shown is a pulley. Amplex makes it in one piece. A precision part that requires no machining—not even of the V groove. This is one example. The Amplexologist will be happy to load his brief case, come to your office and show you many more. Could open your eyes to the possibilities of advanced powder metallurgy (i.e. Amplexology). Might save you some money, too.

AMPLEXOLOGIST

SEND COUPON . . . if you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.

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Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

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(precision tolerance)

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(commercial, precision, AN)

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PLUS all types and sizes of screws (slotted, Phillips–both magnetic and non-magnetic–hex, socket), bolts, nuts, washers, rivets, nails, keys, etc.

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FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 165.

Joining Aluminum

Included in a 40-page, illustrated manual is a complete survey of aluminum welding, brazing, and soldering. Among subjects covered are: welding aluminum and its alloys by inert-gas shielded metal arc, with a consumable electrode, inert-gas shielded metal arc with a tungsten electrode, and the latest arc- and gas-welding processes. The manual contains 12 charts on the composition of aluminum alloys, their technical and physical properties, and recommended filler alloys for MIG and TIG welding. (All-State Welding Alloys Co., Inc.)

For free copy circle No. 1 on postcard, p. 165

Pressure Measurer

Described in a four-page brochure is a pressure-measuring system. A precision pressure transducer and a servoamplifier comprise the system. It is available in standard, high-speed, and miniature models. Photos, schematics, and specifications explain its operation. (Consolidated Electrodynamics Corp.)

For free copy circle No. 2 on postcard, p. 165

Boiler-Burner Units

Illustrated with photographs and line drawings, a four-page, two-color, bulletin describes forced-draft, square-heat packaged boiler-burner units for oil, gas or combination firing. The bulletin also contains ratings, dimensions, and technical data in easy-to-read tables. (American-Standard)

For free copy circle No. 3 on postcard, p. 165

Air Compressors

For standard 110-psi industrial applications, a line of balanced/opposed air compressors is presented in a bulletin. Described and fully illustrated are details of the compact, heavy-duty design. Strokes range from 6 to 17 in. and sizes from 75 to 2000 bhp. Specifications cover the complete line of 23 models. (Clark Bros. Co.)

For free copy circle No. 4 on postcard, p. 165

Transducer

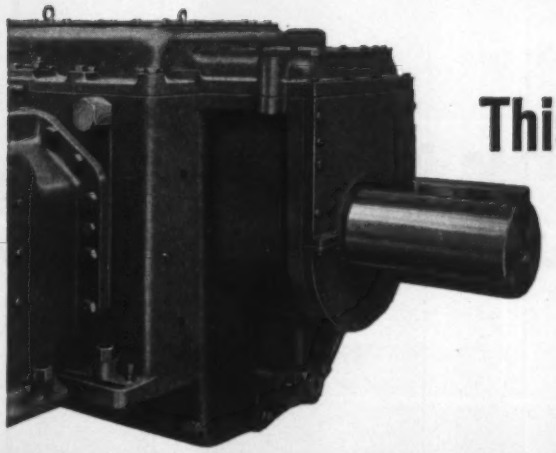
The subject of a four-page bulletin is a Regohm transducer. Highlight of the bulletin is a series of step-by-step drawings which clearly illustrate how the new unit can change 1/10 in. of mechanical motion into stepless control of up to ¼ kw of power. The unit is sensitive to less than 0.0001 in. (Electric Regulator Corp.)

For free copy circle No. 5 on postcard, p. 165

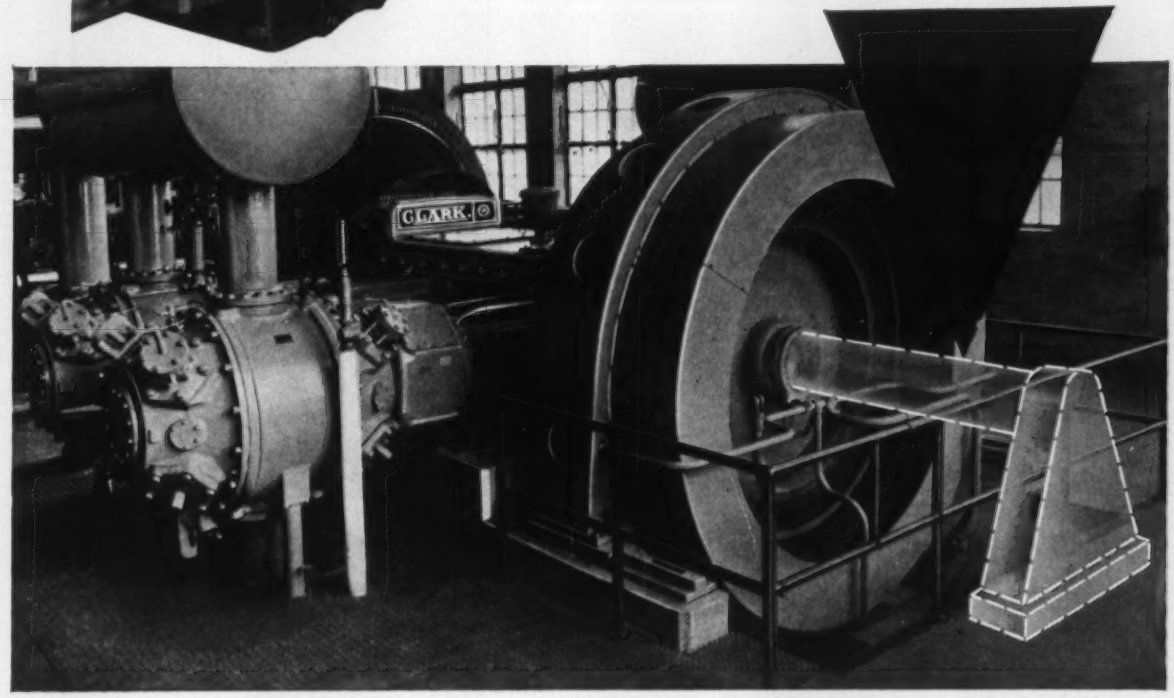
Form Grinder

Described in a 9-page catalog is a machine for grinding annular forms and grooves, in workpieces up to 10 in. in diameter and 24 in. between centers. The form grinder utilizes a grinding-wheel dressing process to grind multiple diameters or forms, up to 4-in. wide in one operation with single or multiple wheels. (The Sheffield Corp.)

For free copy circle No. 6 on postcard, p. 165



This Clark development eliminates outboard bearings



In 10 years, in hundreds of installations, NEVER a motor end-bearing failure!

Since Clark introduced *overhung rotor construction* in its Balanced/Opposed compressors a decade ago, hundreds of these air compressors have been built. Proof of the dependability of this design feature is the fact that not one motor end-bearing failure has occurred in over ten years.

Heavy duty crankcases and generously proportioned crankshafts and main bearings are the main reasons for this proved dependability. Here are additional advantages of Clark overhung rotor design:

EASIER INSTALLATION – Mounting the rotor directly on the crankshaft simplifies installation. Just align the stator to the rotor – that's all.

LESS MAINTENANCE – There is no outboard bearing to be knocked out of alignment. Motor bearing is integral with crankcase, lubrication is automatic. Self-centering of the rotor within the stator removes rotor weight from the bearing during operation.

SIMPLER DESIGN – One piece collector rings. Flywheel effect in most instances is completely built into the rotor thereby eliminating the flywheel.

LESS FLOOR SPACE – Close coupling reduces foundation requirements.

Overhung rotor construction is only one of many features found in Clark Balanced/Opposed Compressors. Review your requirements with your Clark representative for all the facts.

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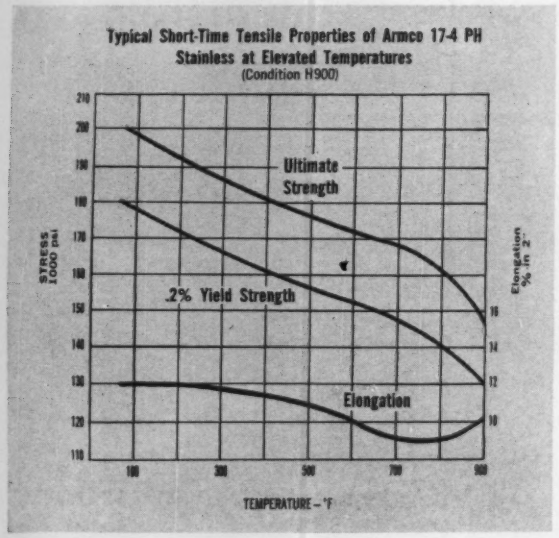
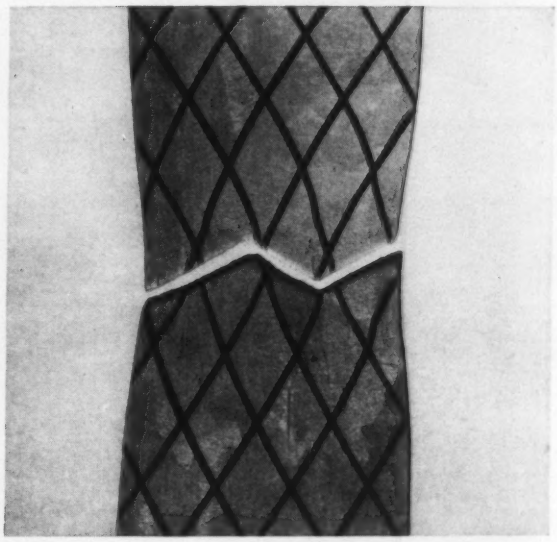


Armco 17-4 PH Stainless Steel Bars

Take a close look at the typical mechanical properties of this Armco precipitation-hardening stainless steel. The combination of excellent corrosion resistance, comparable to that of Type 302 stainless, and high hardness and strength up to 900 F, offers an economical solution to many problems.

Armco 17-4 PH is being widely used by manufacturers of fasteners, pumps and valves, chemical and food processing equipment and a wide range of specialty products. An added advantage: Armco 17-4 PH Stainless is hardened at only 900 F. This one-hour heat treatment eliminates descaling, straightening and finishing operations.



Armco ZINCGRIP® Steel

Fractured tensile test specimen of Armco ZINCGRIP® Steel is cross-hatched to show metal flow. It demonstrates that the full weight hot-dip zinc coating won't flake or peel even when the metal is stretched 60-70% and broken.

This means you can give your products economical overall protection against rusting. There's no need to worry about flaking or peeling of the zinc coating, no matter how severe the forming operations. For only a few cents' premium over cold-rolled steel, you can often eliminate the cost of painting or plating parts. Used for more than 20 years, Armco ZINCGRIP Steel has shown it can cut costs and improve performance. Supplied in sheets and coils.

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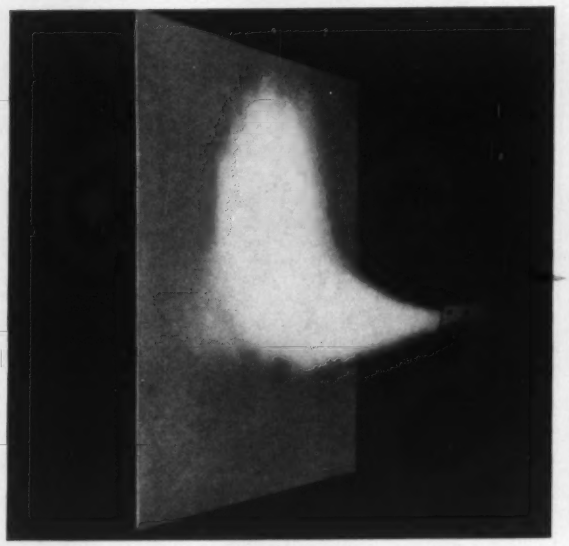
Perhaps these special Armco Steels can help you counteract the effects of rising labor costs and mounting competition. Let us send you complete information so you can evaluate their full potential for your products. Just fill out and mail the coupon.

New steels are born at Armco

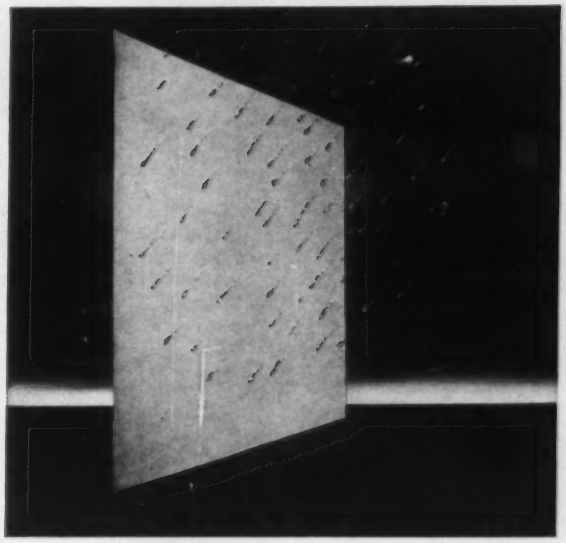
Special Steels Improve Product Design



Armco ALUMINIZED STEEL Type 1

The extraordinary ability of Armco ALUMINIZED STEEL Type 1 to resist heat and a combination of heat and corrosion may help you. This Armco-developed special steel combines the strength of a steel base with a hot-dip aluminum coating that provides good heat reflectivity, as well as resistance to oxidation and corrosion. No other metal in its price class offers the advantages of ALUMINIZED STEEL Type 1.

It is unmatched in economical durability for gas- and oil-fired heat exchangers and combustion chambers, automobile and truck mufflers, drying ovens, appliance parts, and similar applications.



Armco ALUMINIZED STEEL Type 2

Outstanding advantages of this special Armco Steel are its lasting protection against atmospheric corrosion and its low cost. The unique hot-dip aluminum coating provides lasting rust-resistance; the steel base assures adequate strength and rigidity. Corrosion tests and service prove that the coating on Type 2 ALUMINIZED STEEL sheets outlasts unpainted galvanized sheet coatings by at least 3 to 1.

For siding, equipment covers, sheathing, ventilators, roof decking, agricultural equipment and other products exposed to the atmosphere, this special Armco Steel assures long service life at minimum cost. ALUMINIZED STEEL Type 2 is available in sheet and strip in a wide range of gages.

ARMCO STEEL

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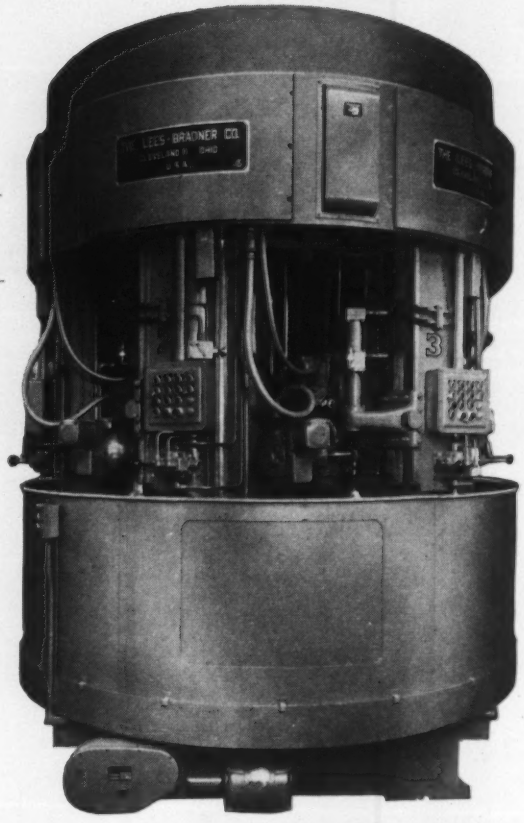
Sets the HOBBING pace for tomorrow

with 6 machines in 1 . . .

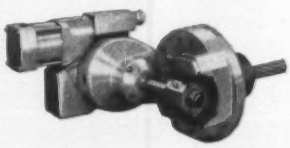


Lees-Bradner Model 7 HD 8″ x 20″ 6-Spindle Rotary Hobber. Also available in single and 4-spindle models.

Here's a complete hobbing production line in one space-saving unit. Actually the Lees-Bradner Model 7 HD 6-Spindle Hobber is six separate and independently operative machines in one. Each hobbing unit incorporates basically the same automatic, high-production features as the remarkable 7 HD Single Spindle Hobber. This includes a heavier, more rugged headstock, heavy-duty column and a 7½ H. P. motor on each spindle. This amazingly efficient machine not only saves valuable floor space but, with its pushbutton controls and automatic features, actually controls the operator thus reducing the chance for human error or slowdown. Chips and coolant are easily carried away from the headstock by the elimination of flat surfaces.

So, if your manufacturing space is valuable and high unit production important, ask your Lees-Bradner representative to give you the story on the ultra-efficient 6-spindle and 4-spindle rotary hobbers. Write or wire us direct for his name and address.

New 7HD HOB HEAD with 3½ inch hob shift. *Just dial it!*



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FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

All-Weather Welders

Completely weatherproofed, dc arcwelding units are described in a bulletin. The welding units are used by ship builders, contractors, and metal fabricators. The bulletin supplies features and specifications for three models. These models are rated 200-, 300-, and 400-amp welding current, respectively. Optional equipment and accessories for the horizontal rectifier-type welders are described and illustrated. Installation of the units for parallel operation is discussed. (Chemetron Corp.)

For free copy circle No. 7 on postcard

Industrial Plastics

Complete warehouse availabilities of industrial plastics are given in a 12-page booklet. The bulletin contains property and application data on mill shapes of nylons, TFE fluorocarbons, polycarbonates, chlorinated polyethers, and cross-linked polystyrene. Information on a new TFE base resin, and data on nylon pressure hose and tubing is also included. (The Polymer Corp.)

For free copy circle No. 8 on postcard

Filter Elements

The subject of a folder concerns itself with pressure-lock, filter elements. The new type hydraulic and pneumatic filter elements are free of built-in contaminants. The folder details information on the pressure-locking process in which end caps, center tube, and filter medium are mechanically locked under high pressure; this locks the filter element in the parent metal of the end caps to form a leak-proof seal. Included in the folder are specifications for five types of elements, details on degree of filtration, temperature range, construction materials, fluids, and minimum collapse pressure. (Purolator Products, Inc.)

For free copy circle No. 9 on postcard

Aluminum Alloys

An 11-page brochure aids foundries in selecting aluminum alloys for use in producing castings. The brochure includes tables with information on which alloy to use for different methods of casting, mechanical properties of typical alloys, alloy composition limits, and common uses of castings made from various alloys. (Aluminum Co. of America.)

For free copy circle No. 10 on postcard

Cleaning Primer

Designed to provide a clearer understanding of what ultrasonic cleaning is, how it works, areas in which it can be employed and various solvents and detergents available for use with this kind of equipment, a 12-page manual serves as a guide for potential users. (National Ultrasonic Corp.)

For free copy circle No. 11 on postcard

Surface Protection

The subject of a two-page engineering data sheet is a process for oxidation, corrosion and abrasion resistance. The data sheet discusses physical, chemical, and fabrication properties of the surface protection provided by the process. It also covers application methods, thickness specifications and fusing procedures. (Wall Colmonoy Corp.)

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Filter Elements

Discussing wire-cloth fluid filter elements, a four-page, two-color brochure covers typical fluids and systems that can use Poromesh and Micromesh wire-cloth filters. Also discussed are details of design features, environments, construction,

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FREE LITERATURE

performance, and metals for these wire-cloth filters. Photographs and line drawings illustrate typical filter elements. (Bendix Filter Div., Bendix Aviation Corp.)

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Gas Furnaces

Included in a 200-page catalog are complete data and specifications on a broad product line of gas furnaces and accessory equipment. The tab-indexed catalog also has a special section containing considerable reference material and tables useful to heat treaters. (American Gas Furnace Co.)

For free copy circle No. 14 on postcard

Corrosion Tests

Results of eight-year corrosion tests on wrought iron and ten structural steels are contained in a 12-page report. The tests were conducted in salt-water and lake-water environments. The report contains comparative corrosion-time curves, weight-loss tables, and discusses in detail test materials, conditions, methods, and results. (A. M. Byers Co.)

For free copy circle No. 15 on postcard

Machine Tools

A complete line of machine tools is described in a condensed catalog. Included are horizontal boring, drilling, and milling machines and accessories; vertical turret lathes; vertical boring machines; upright and radial drilling machines; planer mills; and planers. (Giddings & Lewis Machine Tool Co.)

For free copy circle No. 16 on postcard

Low-Voltage Equipment

Low-voltage distribution equipment is covered in an 84-page catalog. The catalog is designed so that application, selection, pricing and ordering information can be found quickly and easily. Included in the catalog are: selector charts for each type of product, pictorial descriptions, a cross-referenced catalog number index, ratings, weights, dimensions, standard package quantities, and general application information. (General Electric Co.)

For free copy circle No. 17 on postcard

Photography Manual

Covering a wide area of interest, a manual of case histories of the use of photography by industrial firms is available. From engineering drawings through high-speed motion pictures to X-ray, data is given on film selected. (Ansco)

For free copy circle No. 18 on postcard

Dust Control

Described in a four-page bulletin is a high-energy dust and fume scrubber. The bulletin presents a comprehensive description of the design and operational features of the unit. Also mentioned in the bulletin are over-all dimensions, pressure-drop versus water-rate curves, installation sketches and performance results in several difficult installations. (The Ducon Co.)

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Electrodes

Complete information on a full line of industrial-type pH and oxidation-reduction electrodes, and electrode mountings is contained in a four-page data sheet. Two tables aid in selecting the type of electrode and mounting needed for a wide variety of applications. (Leeds & Northrup Co.)

For free copy circle No. 20 on postcard

Stainless-Steel Drums

The use and care of stainless-steel shipping and process drums is described in a 12-page, two-color booklet. Illustrated publication discusses: the varied applications for corrosion-resistant metals; variety of uses for shipping and process drums; and a list of eight helpful hints on the care and cleaning of stainless-steel drums. Also included are design features and specifications on shipping and process drums. (Inland Steel Container Co.)

For free copy circle No. 21 on postcard

CREATIVE COST CUTTING

Selecting the metal to fit the job can give you surprising savings in total cost

Small spring clips between telescoping parts of auto radio antennas must maintain electrical contact, hold parts firmly, give smooth sliding action. Brach Manufacturing Division of General Bronze Corp., Newark, N. J., found that spring clips of Duraflex®, Anaconda superfine-grain phosphor bronze, gave best positive electrical contact and improved smooth action in Brach Auto Antennas over original clips made of premium metals. The clips stand up in constant use, spot welding and fabrication are easier—and costs are about 25% lower.

In this G-E Automatic Coffee Maker control, a thermostat turns cam actuating switches—for high heat to brew coffee, for low heat to keep it warm. At first, upper switch element was an assembly of blade, bushing, and locking nut. Tinnerman Products Inc., Cleveland, Ohio, engineered a one-piece Speed Clip to replace it—by forming one thread in the blade and two prongs to lock the screw (see inset above). This simplification called for a superior phosphor bronze. Tinnerman found it in Duraflex, Anaconda superfine-grain phosphor bronze. It has higher tensile strength and endurance limit for long-lasting dependability—greater formability for economical manufacture. The result: unit costs were cut— and G-E assembles controls faster, more easily. 6045

Quality control and cost reduction can go hand in hand. The secret is often simply matching the metal to the job. And Anaconda specialists, starting with 93 standard alloys, can offer an almost unlimited number of combinations of useful properties. For creative help in meeting your problems, write The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

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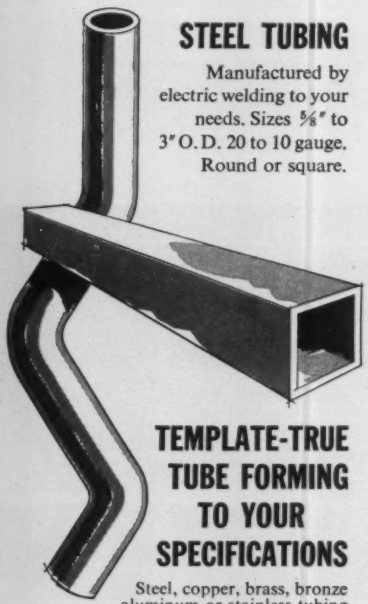

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Design Experts Meet

■ Members and guests of the American Society of Mechanical Engineers will convene in the New York Coliseum, May 23 to 26, for the fifth annual Design Engineering Conference and concurrent Design Engineering Show.

The conference and show are sponsored by the mechanical design division of the American Society of Mechanical Engineers.

The program follows:

Sessions

Mon., May 23—9:45 a.m.

NEW HORIZONS IN ENGINEERING DESIGN (A Panel Session)

Co-Chairmen: Dr. Hugh L. Dryden, National Aeronautics & Space Administration; Dr. Arthur R. Kantrowitz, Avco - Everett Research Laboratory, a div. of Avco Corp.

Panel Members: William R. Gall, Reactor Experimental Engineering Div., Oak Ridge National Laboratory; Varick D. Schwartz, Army Boiling Water Reactor Project, Combustion Engineering, Inc.; George P. Sutton, Advanced Research Projects Agency, Department of Defense; Elmer P. Wheaton, Douglas Aircraft Co.

Tues., May 24—9:30 a.m. (All concurrent)

RELIABILITY (A Power and Control Session)

Co-Chairmen: Frank McGinnis, Sperry Gyroscope Co., div. of Sperry-Rand Corp.; Nicholas Osifchin, Bell Telephone Laboratories, Inc.

Reliability Prediction as a Design Tool, by Thomas C. Reeves, Radio Corp. of America.

Impact of Reliability on Design, by Harry R. Powell, Space Technology Laboratories.

FABRICATION (A Materials Session)

Co-Chairmen: Hemenway R. Bullock, Raytheon Co.; John Alico, Day & Zimmermann, Inc.

New Welding Processes, by John J. Chyle, A. O. Smith Corp.

Metal Part Fabrication by Explosives, by Vasil Philipchuk, National Northern Div., American Potash & Chemical Corp.

HYDRAULICS (A Mechanical Session)

Co-Chairmen: Edward M. Greer, Greer Hydraulics, Inc.; John Farris, Pall Corp., Aircraft Porous Media, Inc.

Trends and Factors Influencing Hydraulics, by Edward Brown, Vickers, Inc.

Hydraulic Fluids — Today and Tomorrow, by Richard L. Leslie, Vickers, Inc.

Wed., May 25—9:30 a.m. (All Concurrent)

CONTROL SYSTEMS (A Power & Control Session)

Co-Chairmen: Dr. E. L. Harder, Westinghouse Electric Corp.; John T. Lynch, Burroughs Corp.

Analysis of Control Systems by Analog Computers, by William E. Sollecito, General Electric Co.

Computers in Control Systems, by Dr. Arthur S. Robinson, Eclipse-Pioneer Div., Bendix Aviation Corp.

MATERIALS (A Materials Session)

Co-Chairmen: Albert R. Mead, Grumman Aircraft Engineering Corp., and Edward Hegge, Watertown Arsenal Laboratories, U. S. Army Ordnance Arsenal.

Some Considerations in the Use of High-Strength Steels, by A. M. Hall, Battelle Memorial Institute.

Increasing the Performance of Non-Metallic Structural Materials, by W. E. Dirkes, Wright Air Development Center, Wright - Patterson Field.

AUTOMATION (A Mechanical

Session)

Co-Chairmen: George F. Hawley, Automation Engineering Laboratory, Inc., and Allan Harvey, Dasol Corp.

Concept of Modular Design for Mechanized Assembly, by A. A. Lawson, Melpar, Inc.

Basic Design Parameters for Automatic Assembly, by Robert Esken, Sheffield Corp., subsidiary of Bendix Aviation Corp.

Thurs., May 26—9:30 a.m.

USE OF COMPUTERS IN DESIGN (A General Engineering Session)

Co - Chairmen: Dr. Julius S. Aronofsky, Socony-Mobil Oil Co., Inc.; Raymond Payne, Worthington Corp.

Panel Members: E. F. Magnusson, General Electric Co.; George Ryckman, General Motors Corp.; Dr. Aaron Finerman, Republic Aviation Corp.

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Acme Steel Co.	2235
Acro Div., Robertshaw-Fulton Controls Co.	427
The Adams & Westlake Co.	1038
Aeroquip Corp.	1809
Aetna Ball & Roller Co.	927
Aircraft & Missiles Mfg.	928
Air-Maze Corp.	1134
Alemite Div.	732
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American Sealants Co.	1009
American Smelting and Refining Co.	904
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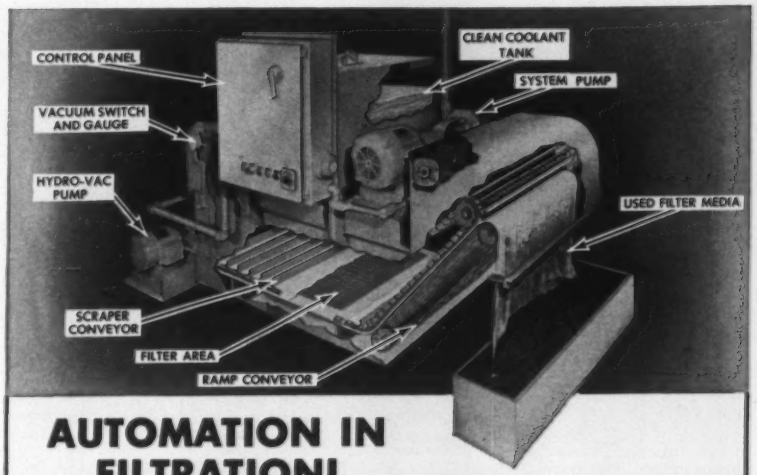
Atlas Precision Products Co.	1916
The Auburn Mfg. Co.	1505
Automatic Switch Co.	1438



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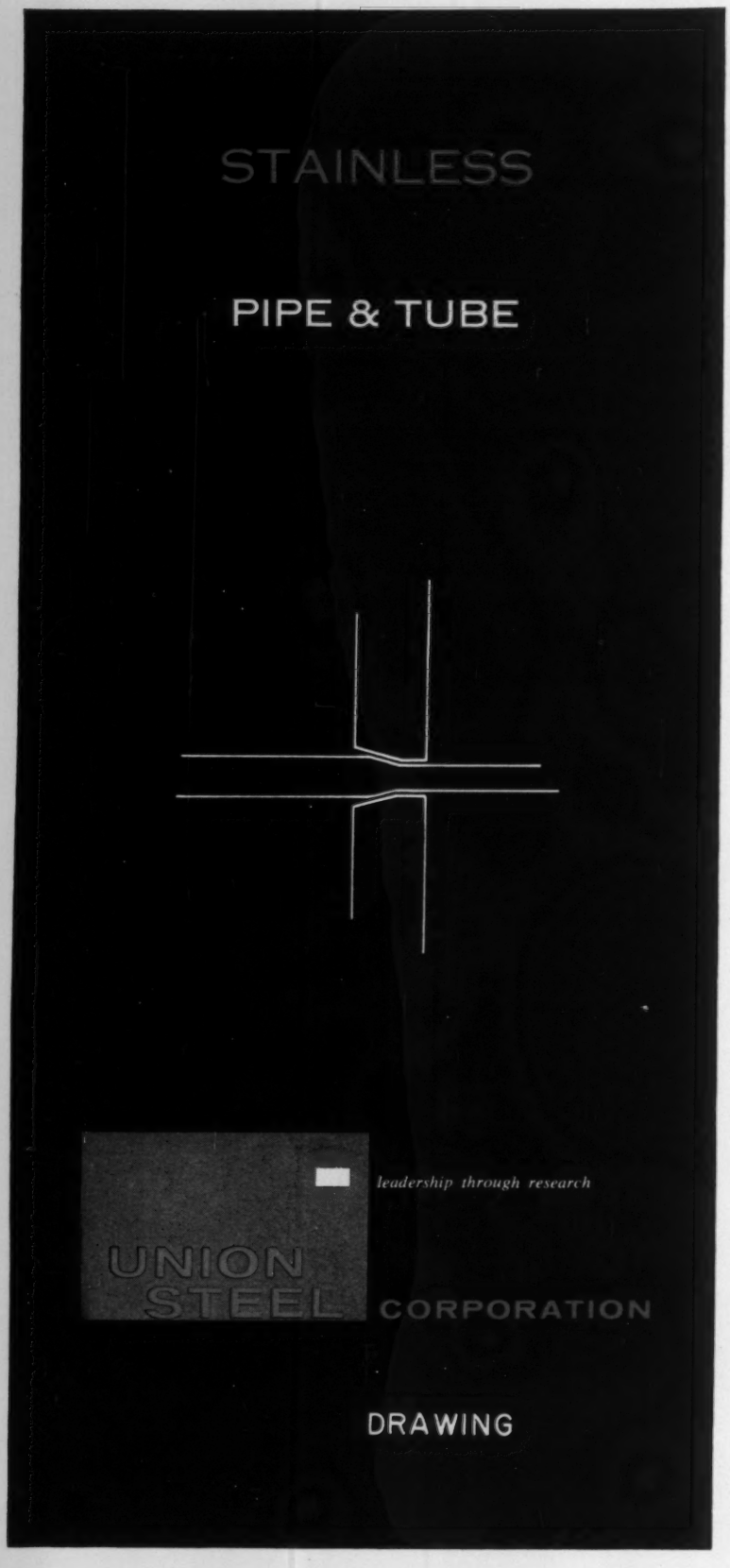

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Automotive Industries	928
Avery Label Co., A Div. of Avery Adhesive Products, Inc.	535
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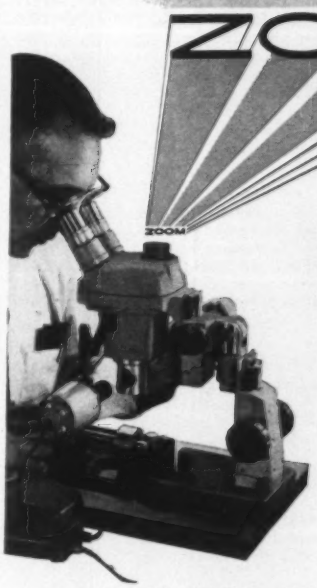

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Handy & Harman	1715
The Hansen Mfg. Co.	628
Hartford Steel Ball Co., Inc.	1026
John Hassall, Inc.	1639
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The Heim Co.	2113
Heli-Coil Corp.	1828
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Lovejoy Flexible Coupling Co.	1504
MM Enclosures, Inc.	2335
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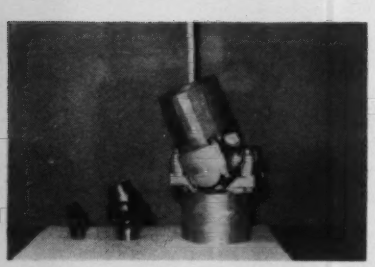
New Materials and Components



Universal Joint Features Large Swing Diameter

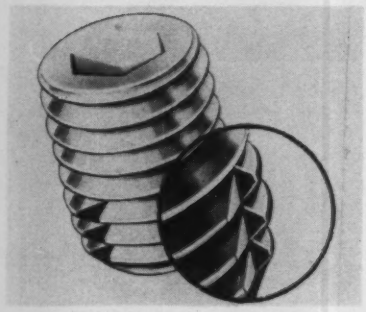
For heavy-duty industrial applications, a universal joint has a capacity for a swing diameter of 13½ in. The joint has a maximum torque capacity using a safety factor of 10 to 1 of 162,000 in. lb, and a breaking factor of 600,000 in. lb. The joint uses needle bearings, and assembles and disassembles by installing or removing four bolts. It is available as a plain joint, double joint, or assembly. (Rockwell-Standard Corp.)

For more data circle No. 22 on postcard, p. 165

Vacuum Gage Offers Single-Knob Control

Measuring high vacuum, a cold-cathode type discharge gage features quick, easy replacement of the cathode and anode, when they become contaminated. The gage has a wide range—from 10^{-1} to 10^{-6} mm of mercury. The system consists of two basic units—the gage tube and the control circuit and meter. When a voltage is introduced between the cathode and the anode of the gage, the resulting dc current, between the two electrodes, is proportionate to the gas present, which in turn is the pressure. A triple scale indicates the pressures. (F. J. Stokes Corp.)

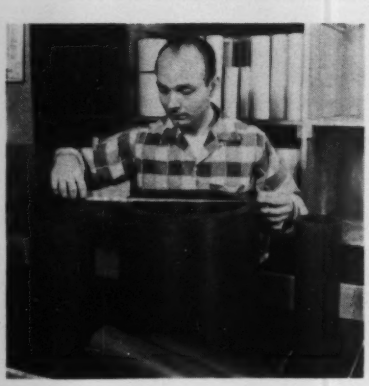
For more data circle No. 23 on postcard, p. 165



Self-Tapping Set Screw Cuts Production Costs

Designed to eliminate the tapping problems in most metals and plastics, a self-tapping set screw actually has a tendency to pull itself in. This is due to the exclusive design of the cutting edges. The screw's oversize flutes gather into them metal and plastic chips. The cutting-in action takes place at the lower three threads of the screw. It is possible to use this screw for standard applications as well. It can be used for sizing poorly-tapped holes, and for easy insertion in paint-filled holes. Slabbed, slotted or socket heads are available. (Set Screw & Mfg. Co.)

For more data circle No. 24 on postcard, P. 165



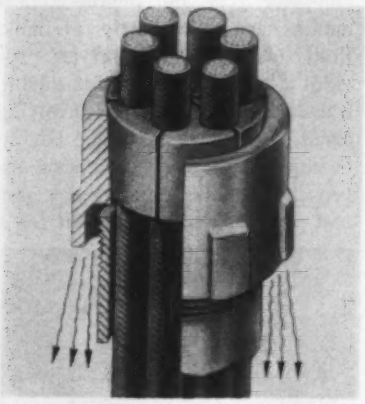
Tubular Nylon Bars Find Widespread Use

Reduced prices of nylon tubular bars permit wider use, utilizing its unique advantages where necessary. Operating without lubrication, nylon also resists peening under shock or vibration, and has sound-dampening characteristics. Lubricated nylon bearings operate over the same general range of speeds and loads as bronze bearings. The new nylon material is lightly cross-linked, provides improved resistance to deformation under load, improved wear characteristics, and better dimensional stability than standard nylon compositions. The tubular bars are available in outside diameters ranging from 2 to 15 in. Wall thicknesses of ⅜, ½, ¾, and 1 in. are considered standard. (The Polymer Corp.)

For more data circle No. 25 on postcard, P. 165

Cable Supports

For use on vertical conduit runs, a line of cable supports simplifies installation and supports four times the cable weight specified by the National Electrical Code. This also includes thermoplastic-insulated cable. The support employs a vented, cast-aluminum body that is threaded to the conduit. Cable is supported and locked by tapered phenolic inserts, that fit around the cables and



into the aluminum body. Inserts are drilled with undersize holes for each cable size, and are available for one to six cables and for use on up to 6-in. conduit. The inserts completely surround and grip about 90 pct of each cable circumference. Inserting the tapered, phenolic grip sections around the cables and into the body initiates locking action. (The Adalet Mfg. Co.)

For more data circle No. 26 on postcard, p. 165

Cushion Packaging

Cutting shock and vibration damage, a low-cost cushion packaging creates a floating inner package, held firmly on all eight sides of the shipping container. This cushion absorbs vibration and shock during shipment of the products. Fitting into each corner of an outside shipping carton, the foam-laminated-to-heavy-corrugated supports an inner container holding the product being shipped. Four more shock-absorbing corner pads are then placed around top of inner package before sealing outer container. The pads maintain a tight package. The various pads will handle packages ranging from 8 to 150 lb. (Hardigg Industries)

For more data circle No. 27 on postcard, p. 165

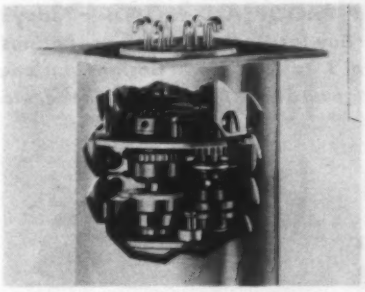
Color Coatings

Available in 18 high-heat-resisting colors, color coatings can be applied on surfaces previously regarded as too hot to paint. The new coatings, depending on the shade used, permit color coding or complete finishing of metal components subjected to high temperatures. Typical applications include: heat transmission lines, traps, stacks, vents, ovens, radiators, and pressure furnaces. The bright, elastic finish is resistant to moisture, corrosion, mild acids, alkalies, and industrial fumes. (Speco, Inc.)

For more data circle No. 28 on postcard, p. 165

Industrial Timer

Hermetically sealed, an automatic reset time-delay timer is specifically designed for applications requiring extreme accuracy and dependable service. Its time cycles are factory set, 1 second to 60 hours,



and it has a switch rating of 5 amp at 115/60; voltages—6 to 230 v, 25, 50, 60, or 400 cycles; 6, 12, 24, 28, 115 v dc. (Industrial Timer Corp.)

For more data circle No. 29 on postcard, p. 165

Medium-Soft Grease

For extreme, high - temperature applications, an anti-seize compound consists of a mixture of a thermally-stable silicone oil, with a solid-type lubricant blended to the consistency of a medium - soft grease. Its excellent thermal stability and anti-weld properties meet the requirements for high tempera-

"the HITCHINER way..."

saves 35 MACHINING OPERATIONS with INVESTMENT CASTING

This barrel of a .22 caliber target revolver is now being cast by Hitchiner's new ceramic shell process. This new investment casting technique provides sufficient close tolerances and finishes to eliminate the need for 35 machining operations. Gun barrel tolerance of 0.006 inch was normal, but plus over minus 0.001 inch was maintained on certain areas. Only external finishing needed was partial polishing.

These savings have allowed the manufacturer of this revolver to sell it for considerably less than a similar previous model.

Through investment casting, parts can be designed for function and maximum operating efficiency with the widest selection of alloys from which to choose. This freedom from manufacturing problems can result in more flexibility in design and less waste in production.

Send us a sample or blueprint and check your specific problem with our "engineered quotation" — no obligation, of course.

Find out how our new ceramic shell technique can possibly benefit you. Send for our free, new revised brochure explaining investment castings.

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MANUFACTURING COMPANY INC.
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Tomorrow's Electric Motors are available today . . . .

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DESIGNED and PROVED

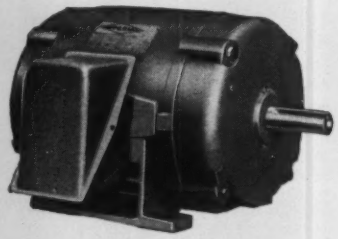
BEST POWER FOR THE STANDARD OR THE UNUSUAL MOTOR APPLICATION . .

IMPERIAL

Modern as the missile age . . . Imperial electric motors are created with a background of more than 70 years of industrial drive experience.

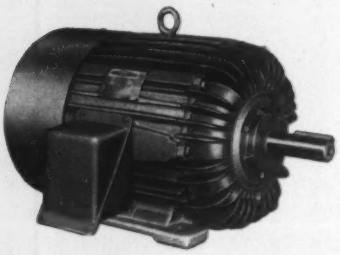
Now, through the use of electronic computers, multiple-design review is made possible in advance of production. Optimum performance is assured while delivery of special-purpose designs is speeded.

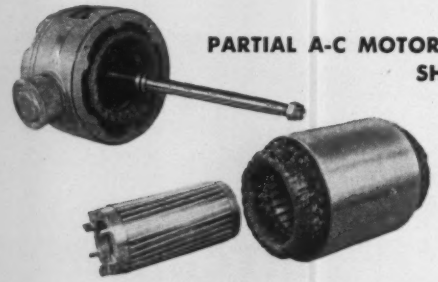
For standard NEMA motors and for motors to meet unusual drive requirements, you will do better with Imperial. Write for bulletin covering *The Imperial Line* of integral horsepower motors, generators and motor-generator sets for every application.



DRIP-PROOF A-C MOTOR— ***Today's Best Buy for Most Applications—Ratings from 1 to 200 Hp.—Designs Include Flange and Face Types, Multi-Speed, etc.***

TOTALLY-ENCLOSED, FAN-COOLED A-C MOTOR ***Provides Dependable Operation Under Abnormal Conditions — Also Available in Explosion-Proof Design—1 to 100 Hp.***





PARTIAL A-C MOTOR . . .

SHELL-TYPE SHAFTLESS MOTOR ***. . . Other Special or Specific Types . . . Provide Maximum Power in Minimum Space . . . Blend with Basic Design of Machines.***

IMPERIAL ELECTRIC COMPANY

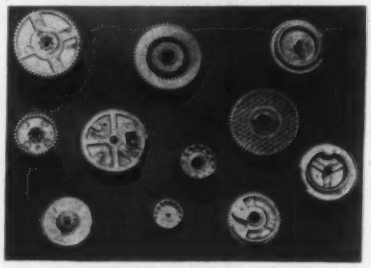
84 Ira Avenue • Akron 9, Ohio

ture ranges of 400° to 600°F. The grease is available in 1- and 5-lb cans, 14-oz cartridges and 35-, 100-, and 400-lb drums. (Lehigh Chemical Co.)

For more data circle No. 30 on postcard, p. 165

Gears and Pinions

Hundreds of zinc-alloy die-cast one-piece gear and pinion combinations are immediately available from stock dies. This service provides a low-cost method for solving transmission problems involving small, light-load gearing. Highly flexible, this new manufacturing approach enables combining any gear and pinion stock die element for a



production run, eliminating the need for expensive new tooling. Gears and pinions are made to AGMA standards for fine tooth 14½° involute form gears with slight modifications. Extra clearance is provided at pitch lines and root diameters to permit broader manufacturing tolerances. (Gries Reproducer Corp.)

For more data circle No. 31 on postcard, p. 165

Brass Pellets

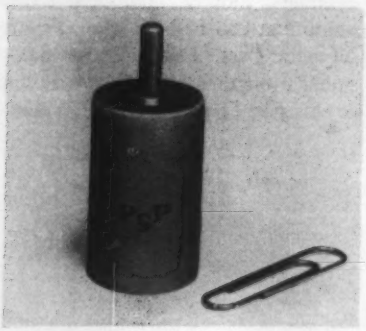
Faster, improved melting is made possible with copper-base alloy brass and bronze pellets. Pellets eliminate the need to pile, pick up, carry, lift and throw ingots by making it possible to store, handle, and charge copper-base alloys by means of bins, hoppers, valves, pipes, and feeders. Melting is faster and chargers denser, because pellets fill voids. Pellets also aid in melting return scrap, gates, risers, and boring; and they mean less frequent charging and poking. Use of the pellets al-

lows closer analyses, greater uniformity and fewer checks and controls. (I. Schumann & Co.)

For more data circle No. 32 on postcard, p. 165

Rotary DC Solenoids

Engineered for applications where a combination of high torque and precision rotary motion is desirable, rotary dc solenoids provide reliable performance under severe operating conditions. Typical applications include: operation in high-temperature environments, in pressurized mechanisms, and in aircraft or military systems requiring exacting performance. In addition,

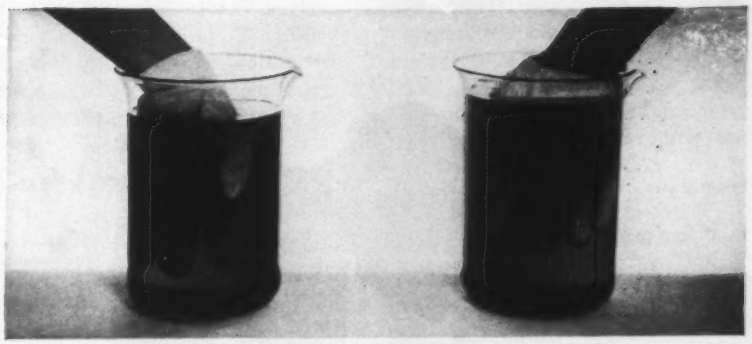


these units are especially suited for installations where no axial travel of the output shaft can be tolerated. The units can be supplied in any stroke length from 0 to 60°, clockwise or counter-clockwise rotation, with custom - engineered torque characteristics. Operating voltages range from 6 to 300 v dc. (PSP Engineering Co.)

For more data circle No. 33 on postcard, p. 165

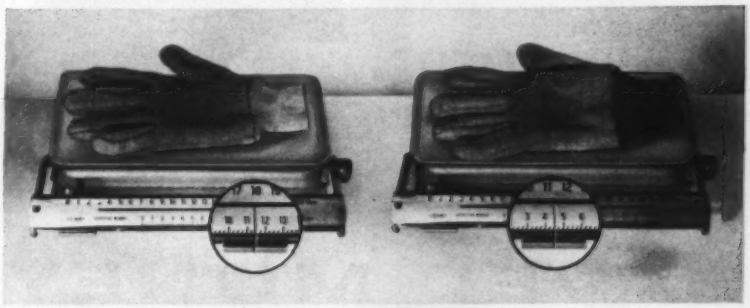
Gas Burner

High stability is obtained when using any one of a new line of sealed-in, nozzle-mixing burners, which give dependable operation whether burning gas or light oil. A flame safety feature is optional. Burner design is for application where large amounts of excess air are advantageous in securing temperature uniformity—from 400 to 900 pct on oil and higher on gas. However, it works equally well at normal air-fuel ratio or at rich ratios up to 50 pct, provided the additional air needed for nearly complete combustion is in the combustion chamber. A 4-in. burner can



Here is an untreated terry cloth glove being soaked in oil.

Here is an oil-repellent Oilmac glove getting the same treatment.



Now we weigh the untreated glove. It is oil soaked and soggy, weighs a full 11½ ounces. Not very comfortable to wear!

But the Oilmac has only surface oil, weighs a mere 4½ ounces. Both gloves weighed 2½ ounces before being immersed.

Proof: Untreated gloves soak up oil...new Oilmacs stay light, comfortable!

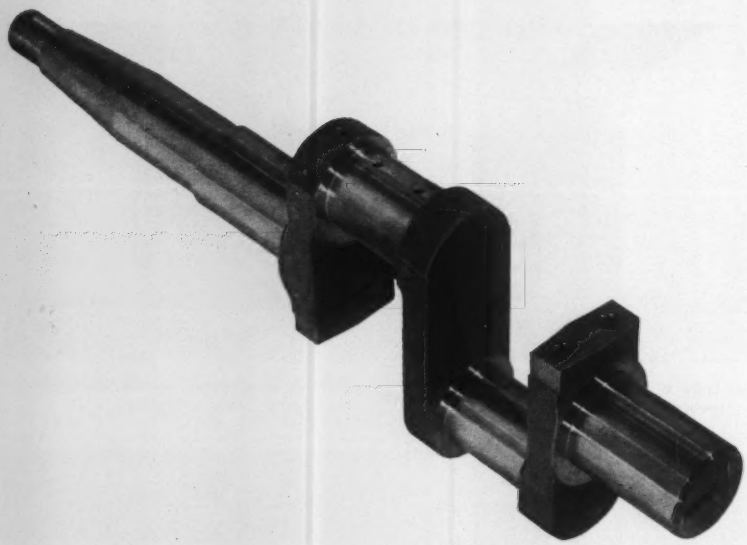
Now you've seen it! Specially treated Oilmacs really repel oil . . . stay light, comfortable, flexible even after *soaking* in oil. Mind you, there's nothing wrong with the untreated gloves: we sell carloads of them, and they are fine for most applications. But where oil is a problem, Oilmacs are the answer! Moreover, new Oilmacs are far more cut resistant than expensive leather gloves . . . can be reconditioned with virtually no loss in oil resistance . . . and are interchangeable, so any two make a pair, any pair gives you four working surfaces. Write today for literature about these new work gloves by Jomac!

Jomac also makes a complete line of North PVC Coated Gloves and Wet Weather Garments

JOMAC

Jomac Inc., Dept. K
Philadelphia 38, Pa.

"Jomac Sells Quality...and Quality Sells Jomac!"



DUCTILE IRON SAVED MONEY

This seventy pound ductile iron crankshaft was made for air compressors manufactured by The Brunner Division of Dunham-Bush, Inc. The increased loads and impact resistance called for by new compressor design specifications required rigidity and strength beyond the limits of the cast iron alloy shafts formerly used. Ductile iron was chosen because the rigidity, yield strength and wear characteristics comfortably exceed operating requirements.

A major cost advantage was realized in this case. Hamilton Foundry used existing pattern equipment made for the gray iron crankshafts in the switch to ductile iron. This saved the cost of new foundry patterns and the greater cost of dies needed for steel forgings. Dunham-Bush achieved a major improvement in product performance for the modest additional cost of the metal in the castings.

When new and unusual design problems arise in the selection of metal and the casting of parts, you will find that the skill and integrity of your foundry is your best insurance that specifications—and delivery schedules—will be met.

GRAY IRON • ALLOYED IRON • MEEHANITE® • DUCTILE (NODULAR) IRON • NI-RESIST • DUCTILE NI-RESIST • NI-HARD

HAMILTON FOUNDRY INC.

1551 LINCOLN AVENUE • HAMILTON, OHIO • TWinbrook 5-7491

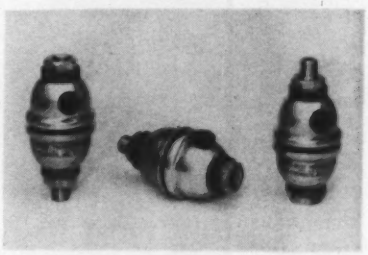
DESIGN DIGEST

have its fuel input turned down from 2560 cfh of natural gas or 19 gph of light oil to 23 cfh or 3.4 gph when using 16 psi air pressure. This results in an available heat turndown ratio of 70 to 1 in a 900°F furnace. The hot-mix temperature then issuing from the tile is less than 950°F and both gas and oil flames are entirely within the tile. (The North American Mfg. Co.)

For more data circle No. 34 on postcard, p. 165

Lubricator

For intermittently-operated air cylinders, motors, and hand tools, aluminum end bells overlap a short oil sight glass. This provides maximum strength and wear protection to this part. The bells come in stan-

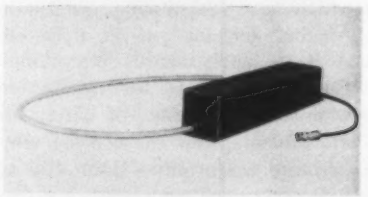


dard horizontal, and up or down air-discharge models. They are available with female inlet and male outlet brass adapters in ⅛-, ¼-, and ⅜-in. pipe-thread sizes. (Carlson Products, Inc.)

For more data circle No. 35 on postcard, p. 165

Immersible Transducers

Both end-fitting type and bulkhead type immersible transducers can be used to add ultrasonic-cleaning stages to existing tanks or vapor degreasers. The line can also be



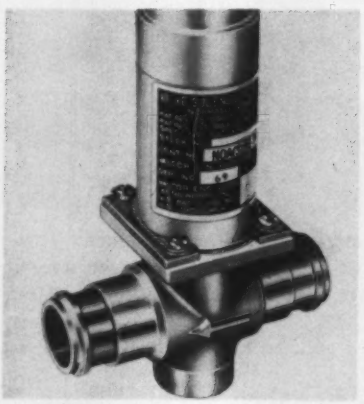
used in new installations with new tanks to add greater flexibility. They are designed for use with most cleaning solutions, solvents and detergents, mild acids and caustics at temperatures to 180°F. The trans-

ducer housings are Type 304 stainless steel cases with heliarc welded seams. Transducer elements are barium-titanate ceramic and operate at about 38,000 cps. (National Ultrasonic Corp.)

For more data circle No. 36 on postcard, p. 165

Solenoid Valve

Weighing only 1¾ lb, a direct-acting valve combines an efficient venturi plus a patented, optically flat floating seal principle. This insures a straight-through flow path without obstructions. The pressure recovery characteristics of the venturi, allow the reduction of the inside diameter of the fluid line to a relatively small throat. This permits the use of a minimum weight,



direct-acting solenoid. Only high-temperature insulating materials are used. Both valve and solenoid are rated from 0 to 255 psi, over an ambient temperature range of —65° to +250°F, with fluid temperatures between —30° and +350°F. The valve is easily adaptable to any type of fitting. (Valcor Engineering Corp.)

For more data circle No. 37 on postcard, p. 165

Tubular Relay

Constructed for high-vibration and shock immunity, a tubular relay is hermetically sealed and dry-nitrogen filled. The armature of the relay is the only moving part in the component. This simplicity of design creates an unusually high degree of reliability in performance. Specifications for vibration are: 15 G, 10 to 2000 cps, and for shock 30 G de-energized, 100 G energized —no contact opening. The life is more than 200,000,000 mechanical operations. (Wheelock Signals, Inc.)

For more data circle No. 38 on postcard, p. 165

Cast-Iron Rolls

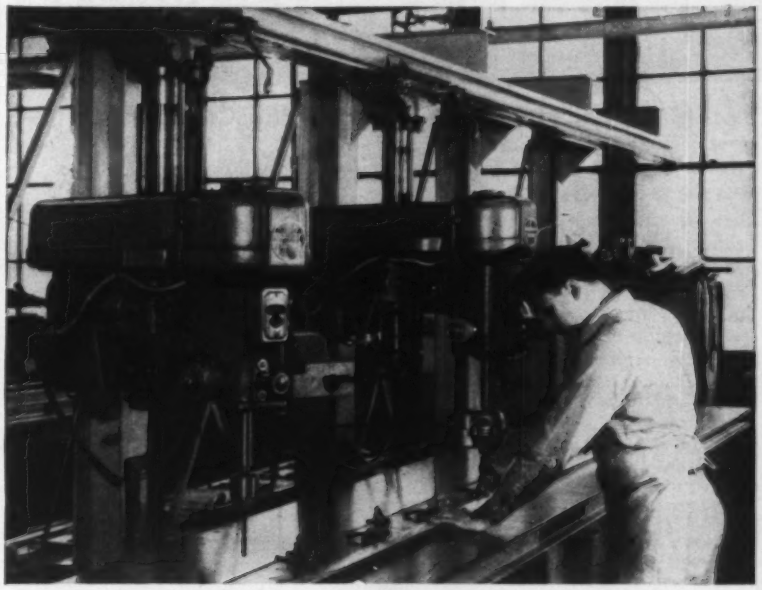
Realizing that no one grade of material can satisfactorily serve all hardened roll requirements, a major manufacturer is now producing various grades of cast-iron rolls to complement their line of hardened-steel products. Hardened cast-iron bridle, blooper, and cluster rolls are finding acceptance in steel mills, paper mills and other industries where properties such as non-galling, non-pickup, and high temperatures are involved. (The Badall Co.)

For more data circle No. 39 on postcard, p. 165

Damping Compound

Sprayed or troweled onto metal plate, a new, viscoelastic material drastically reduces structurally-borne noise and vibration. The

WALKER-TURNER 20″ Drill Press



Cuts costs of drilling and tapping

Mounting two standard Walker-Turner overhead 20″ drill presses on a crane rail provides a low cost, special set-up to speed production at Kidde Textile Machinery Corporation, Bloomfield, N. J. One operator drills and taps 400 holes an hour in strips up to 200 inches long. Use of a multiple head attachment on one drill press permits simultaneous drilling of 5 holes of less than ¼″ diameter.

Like all W-T "Light Heavyweight" metalworking tools, these fast, accurate, versatile drill presses pay their own way under the most rugged, production line use. Your Walker-Turner Distributor (listed under "TOOLS" or "MACHINE TOOLS" in the Yellow Pages) can help you match the tool to your needs. He carries a complete line of 20″, 17″, 15″ and the new 14″ Hi Speed drill presses.

FREE CATALOG—Shows the full line of W-T metalworking tools and accessories. Write: Rockwell Manufacturing Co., Walker-Turner Division, Dept. WE-28, 400 N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Co. of Canada, Ltd., Guelph, Ont.

WALKER-TURNER
"LIGHT-HEAVYWEIGHT" MACHINE TOOLS
another fine product by
ROCKWELL

compound renders metal plate acoustically equivalent to a sheet of cork. The new compound provides a vibration decay rate of 35-55 db. The compound is handled like a coat of paint, dries to a smooth, attractive finish, is non-toxic and non-flammable. It is resistant to alkali, grease, gasoline and aliphatic oils, and is unaffected by ozone or sunlight. (For more data write on company letterhead to The Korfund Co., 48-39H 32nd Place, Long Island City 1, N. Y.)

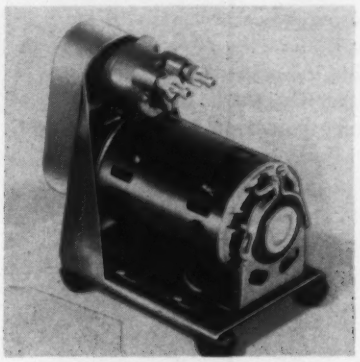
Marking Ink

A novel marking ink which is removable by water meets use where markings are temporary and later removed. Since the new ink is quickly and completely removed by rinsing—no scrubbing is required—it provides an economical way to make such temporary markings. The washable ink has good adhesion to metals and plastics. It is non-corrosive to metals and does not etch metals and most plastics. It withstands considerable abrasion and is not easily removed by the normal handling of marked pieces. (Organic Products Co.)

For more data circle No. 40 on postcard, p. 165

Pumps, Compressors

A line of oil-less vacuum pumps and air compressors finds use on original-equipment applications on automatic controls, instruments, lab



and demonstration equipment. They are for use where space and weight are very restricted. (Gast Mfg. Corp.)

For more data circle No. 41 on postcard, p. 165

Abrasive

Developed especially for stainless-steel billet and slab grinding, a new aluminum-oxide abrasive removes twice as much metal per wheel as the best grinding wheels previously used. Fast rate of cut and long wheel life reduced the total cost per pound of metal by as much as 40 pct. (Norton Co.)

For more data circle No. 42 on postcard, p. 165

Thermocouples

The thermocouples — rhodium-iridium/iridium and tungsten/rhenium—are usable above 3000°F. It has been stated that the rhodium-iridium/iridium thermocouple promises to be highly useful for applications in vacuum or inert atmospheres, and particularly oxidizing atmospheres, up to 3600°F; the tungsten/rhenium thermocouple is outstanding in stability and power

WEBB PLATE FABRICATING MACHINERY

Steelworkers ALL STEEL CONSTRUCTION

DELIVERY 10 DAYS

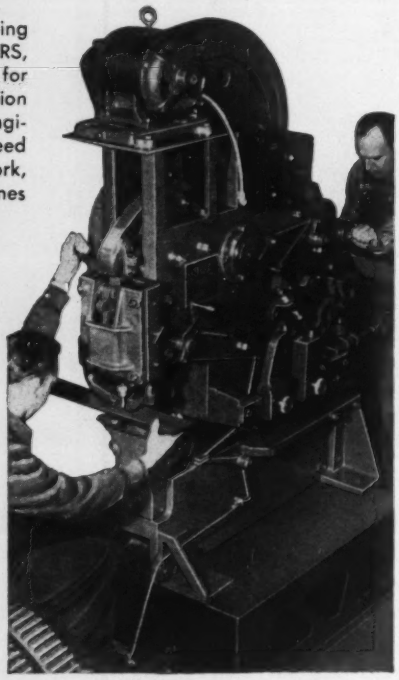
The Webb Corporation, in presenting the line of new WEBB STEELWORKERS, has designed versatile machines for either job-work or high production work. These units have been engineered to meet the particular need of shops having a variety of work, with a result that all-purpose machines are now available.

Five Complete Tools are Incorporated in a Single Unit.

1. Punch for plate, bars or structurals.
2. Cuts angles and tees with straight or miter cut.
3. Cuts off round and square bars.
4. Shears plates and bars.
5. Coping or notching attachment.

One of the main features of these machines is that they are at all times in complete readiness to do any of the above operations and to do the work well.

The punch may be operated at the same time as either the section cutter, bar cutter, shear or the coping and notching attachment . . . therefore, two operators can work at this machine simultaneously without interference. For illustrated literature and prices, write Dept. E.



Let Speed PAY–The WEBB Way!

SLIP ROLLS

PYRAMID TYPE ROLL

INITIAL TYPE ROLL

STEELWORKERS

Also Manufacturers of INDUSTRIAL WEIGHING EQUIPMENT

Since 1881 THE WEBB CORP.

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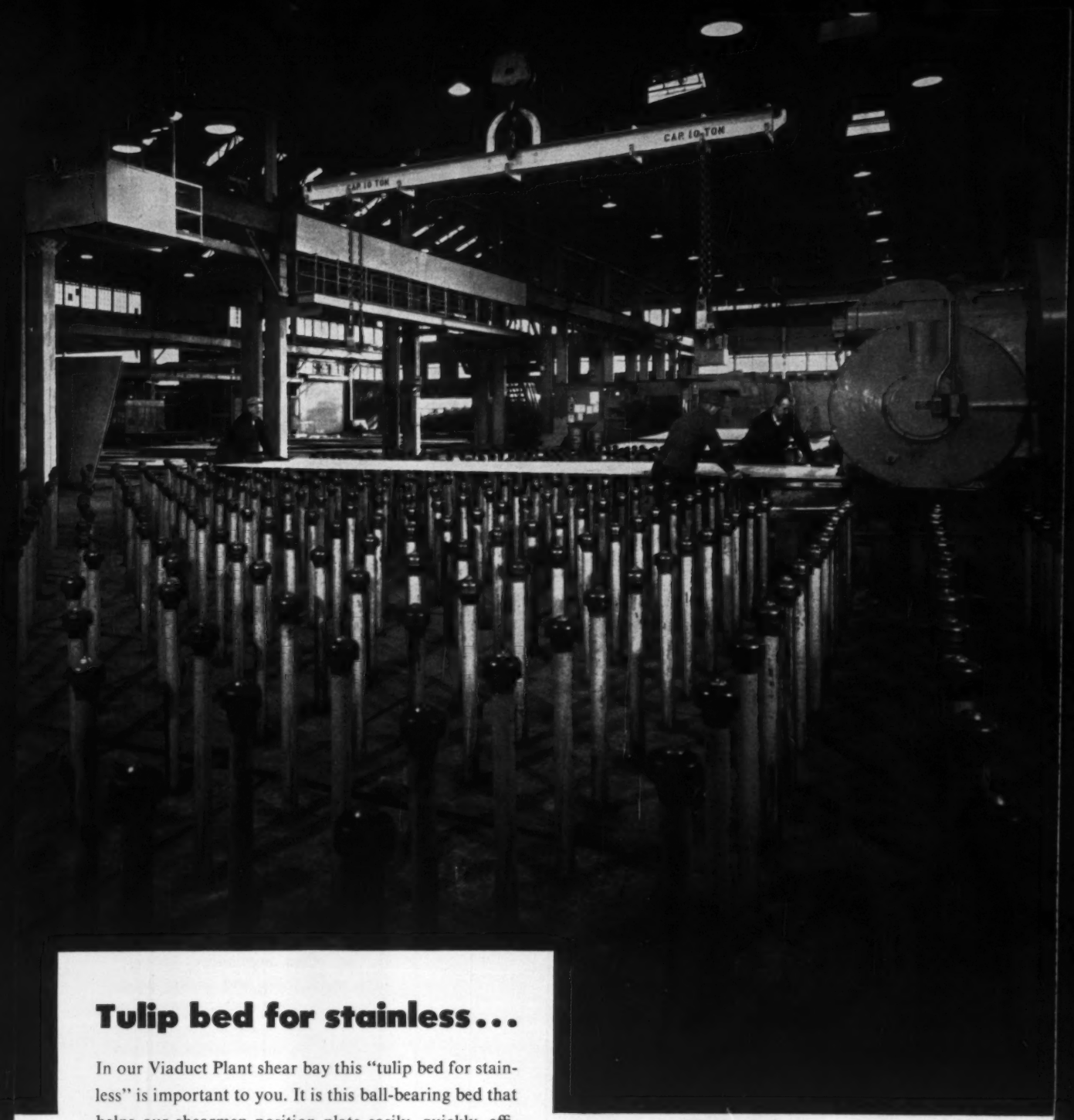

Tulip bed for stainless...

In our Viaduct Plant shear bay this "tulip bed for stainless" is important to you. It is this ball-bearing bed that helps our shearmen position plate easily, quickly, efficiently. But there's more than speed shown here. Carlson engineers modified this modern shear to provide unusually accurate cutting of stainless plate to your specifications.

Equipment of this type, coupled with our thorough knowledge of stainless steel, brings you the finest products . . . the finest service. For almost a quarter of a century it has been our aim to serve you best by producing what you want and delivering it on time.

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District Sales Offices in Principal Cities

PLATES • PLATE PRODUCTS • HEADS • RINGS • CIRCLES • FLANGES • BARS AND SHEETS (No. 1 Finish)

for applications in other than oxidizing atmospheres up to 4000°F, and potentially to temperatures approaching 5000°F. (Brown Instruments)

For more data circle No. 43 on postcard, p. 165

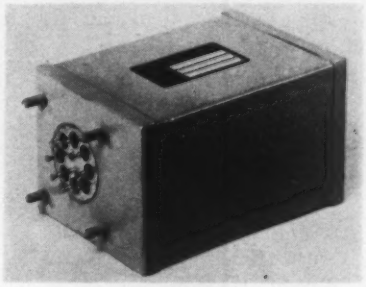
Snap-Action Switch

A new pulse-producing, snap-action microswitch suits industrial applications where momentary opening and/or closing of a circuit is necessary. The switch is especially useful for controlling pneumatic valves where permanent-duty solenoids are not used. The entire pulse operation occurs as the plunger is depressed. No switching action takes place on the plunger return stroke. Mechanical characteristics include 0.15-in. maximum pretravel; 0.6-in. minimum total plunger travel; 4-lb operating force and 8-lb full-overtravel force. Pulse length is adjustable from 0.03 to 0.45 in. The switch is sealed against oil, water, dust and dirt. Electrical characteristics of the single-pole, double-throw switch are 10 amps at 125, 250 or 480-v ac; ½ amp at 125-v dc; ¼ amp at 250-v dc. (Micro Switch Div., Minneapolis-Honeywell Regulator Co.)

For more data circle No. 44 on postcard, p. 165

Voltage Regulator

With regulation held to ±1 pct during input and load variations up to 100 pct, a magnetic voltage regulator operates over a temperature range of —65° to 125°C. This magnetic voltage regulator provides a highly-regulated voltage output

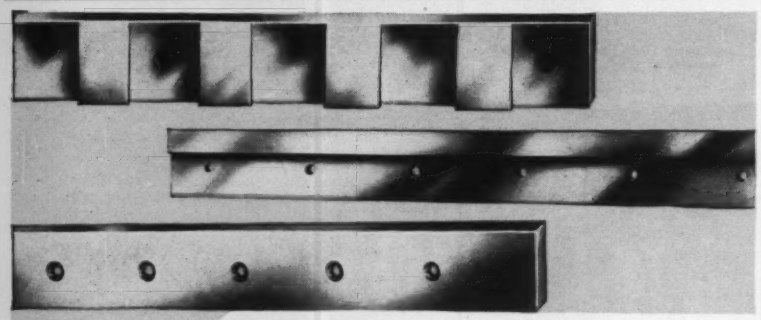


for ground and airborne applications. Input voltage range is 115 v ac, or 28 v dc, with frequencies of 60 cps, or 360 to 1000 cps. Output voltage is 5 to 400 v ac. (Voi-Shan Electronics)

For more data circle No. 45 on postcard, p. 165

Special Motors

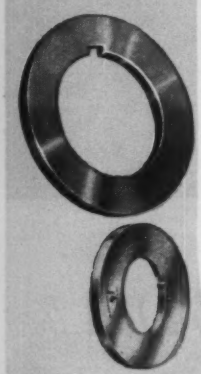
Small special-application motors for ac office appliances, blowers, fans, small tools, and similar products where silent operation and limited mounting space are desired are available in several sizes. Sixteen horsepower ratings are offered between 1/100 and ⅓ hp, based on open-ventilated operation, 40°C rise, constant speed, and continuous duty at 115 v, 60 cycles. The line permits the following choices: four frame sizes; round body, resilient, or rigid mounting; two-, four-, and six-pole speeds; and capacitor start induction run, split phase, permanent split capacitor, or polyphase design. Fans employed in the motor's double-end ventilating system are cast integrally with the rotor.



BUY MORE CUTS WITH
WAPAK KNIVES

Get burr-free cutting with WAPAK blades. Fit any shear for any type of shearing. Engineered to specifications that assure thousands of extra cuts with first-cut accuracy.

SHEAR BLADES
SCRAP CHOPPERS
FLY KNIVES
SIDE TRIMMERS
GANG SLITTERS



WAPAK MULTICUT — Abrasion resistant high-carbon, high-chrome tool steel, heat-treated in electrically controlled furnaces to maintain exact hardness requirements. Shear cold metals such as mild steel maximum .250 thickness or equivalent in tensile strength in other metals such as stainless steel, automobile sheets, high silicon sheets, tin plate, strip steel, copper, brass and aluminum. Cuts from 4 to 10 times amount formerly sheared with carbon steel blades.

WAPAK TUFCUT — Exceptional toughness and greater abrasion resistance for high-production shearing of cold materials in excess of .250".

WAPAK HOTWORK — Specified for shearing hot metal. Each blade made from special alloy tool steels to fit the particular job.

WAPAK STANCUT — Specifically developed for economy operation in general purpose shearing.

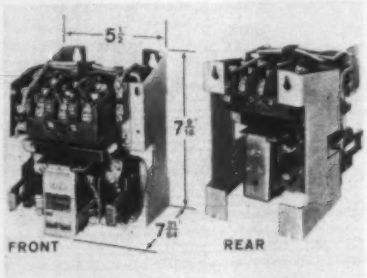
WAPAK KNIVES
THE WAPAKONETA MACHINE CO., WAPAKONETA 11, OHIO
Export Div.: 30 Church St., New York 7, N.Y.
Knives Engineered for the Job Since 1891
Also manufacturers of HARDENED SPACERS • HARDENED WAYS • GIBS • ROCKER PLATES • WEARING PLATES • MACHINE LINERS

High-velocity air is pulled through venturi baffles in the die-cast aluminum end heads. This air is directed in a washing action around the coil ends, then exhausted through openings in the motor shell. (Fractional Horsepower Motor Div., Robbins & Myers, Inc.)

For more data circle No. 46 on postcard, p. 165

Reversing Starters

Cutting panel space by about 50 pct, a line of reversing starters is designed for piggy-back mounting. This way, they occupy almost the same space as non-reversing starters. All load and control connections are made from the front for easy wiring. The reversing starter line is available in NEMA sizes 0, 1, 2 and 3, with either melting alloy or bi-metallic overload relays. (Square D Co.)

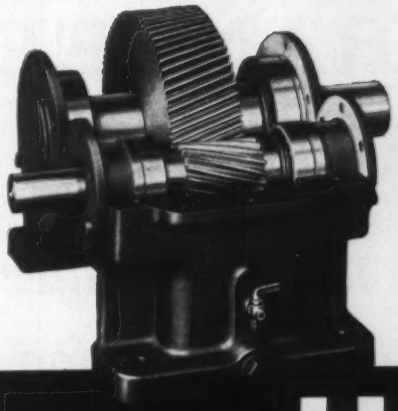


For more data circle No. 47 on postcard, p. 165

Steel Panels

Low-cost, insulated, steel sidewall panels can be assembled during erection in the field. The panels are constructed by sandwiching a layer of insulating material between two sheets of Truscon 24-in. Ferrobord or galvanized ribbed siding. The assembled panels have a heat-transmission coefficient of 0.18. Uses for the steel sidewall panels extend to warehouses, office buildings, and all other types of commercial and industrial structural-frame buildings. The steel panels are furnished painted or galvanized, in widths of 2 ft, and up to 40 ft in length. Interlocking side joints are so designed as to blend with the fluted design of the panel. Galvanized panels meet A.I.S.I. specification. (Republic Steel Corp.)

For more data circle No. 48 on postcard, p. 165



Fast Delivery on Custom Requirements

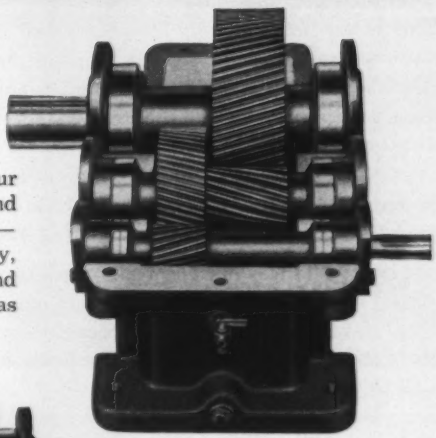
Specify **H & S**

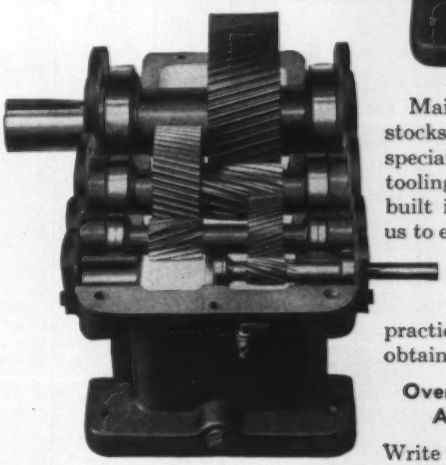
Helical Speed Reducers

Single · Double · Triple Reduction

You get *fast action* when you come to Horsburgh & Scott with your speed reducer and gearing problems.

We are able to meet your specifications—or design and build to your specific needs—products of highest quality, backed by the experience and reputation of many years as leaders in the gearing field.





Maintaining one of the largest stocks of patterns and blanks . . . special equipment and special tooling—much of it designed and built in our own plant—enables us to engineer and produce a wide range of custom gearing and transmission requirements, economically and practically as fast as you can obtain them from stock sources.

Overall design conforms to AGMA specifications

Write for details on wide size and capacity range of H&S Speed Reducers—Helical, Herringbone, Worm Gear and combinations.

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Specializing in fast production of quality Speed Reducers and Gearing to meet custom requirements.

A GUARANTEED ROOF OVER YOUR HEAD

New...and only with Butler... full 20-year roof protection for pre-engineered buildings

Here's another reason to "go Butler" for your new building this year. You can have a preferred aluminum roof of such job-tested superiority that we are now able to offer a *20-year guarantee.*

This is the first and only long-term roof guarantee for pre-engineered buildings. It is made possible by Butler's leadership in designing and fabricating an enduring, weatherproof aluminum roof system that today has an impressive history of outstanding performance on thousands of Butler Buildings. Be sure that this new development in roof security, optional at nominal extra cost, is considered in your building plans.

Your Lowest-Cost Way to Build Well—superior roof protection is one of many reasons why more offices, plants, stores, warehouses, terminals, recreation centers, schools and churches every year are being built with the Butler Building System.

For your new building, take advantage of the wide, clear spans of Butler rigid frames . . . the beautiful new Butler-Tone™ baked-on color finishes for wall and roof panels . . . your choice of the finest factory-insulated or field-insulated exterior wall panels . . . the fast, trouble-free construction . . . and the dependable, talented services of your local Butler Builder.

Interested? See the Yellow Pages for the name of your Butler Builder, under "Buildings" or "Steel Buildings." Ask about financing, too . . . or write direct.

See Sweet's Industrial Construction File—Section 8-B

MBMA METAL BUILDING MANUFACTURERS ASSOCIATION

BUTLER

BUTLER MANUFACTURING COMPANY
7376 East 13th Street, Kansas City 26, Missouri

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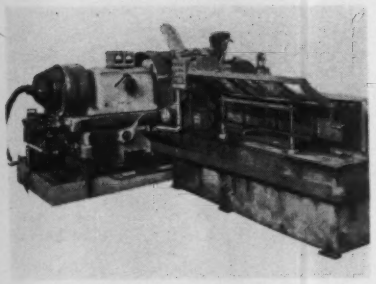
Sales offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Kansas City, Mo. Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. • Cleveland, Ohio • Pittsburgh, Pa. • New York City and Syracuse, N.Y. Boston, Mass. • Washington, D. C. • Burlington, Ontario, Canada

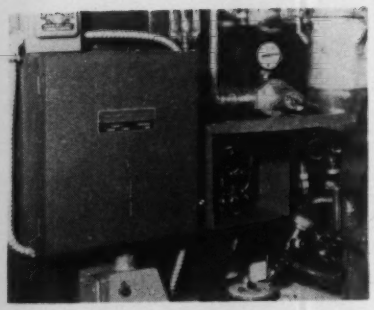
New Equipment and Machinery



Chain-Feed Grinder Features High Stock Removal

Rigidity, positive spindle feed and 50-hp spindle drive motors account for a new grinder's ability to remove stock, at practical limits governed by thickness of the part and wheel economy. Production tests show the chain-feed, double-disk unit removes up to 5 cu in. of stock per minute. The "disappearing link" principle permits a variety of part sizes to be fed into the machine without adjustment in the loading mechanism. A dial indicates when wheel wear approaches limits. (Mattison Machine Works)

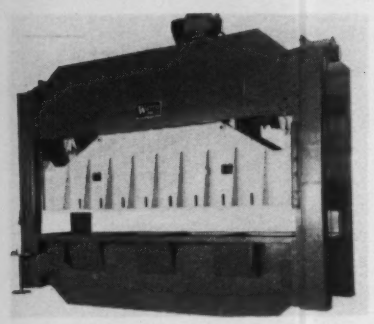
For more data circle No. 50 on postcard, p. 165



Dispensing Unit Improves Automatic Soldering

An improved paste solder dispensing setup permits automatic soldering at a production rate of up to 8400 joints per hour per machine. It's due to improvements in timing devices and recovery action. The unit's electronic-eye control cycles in excess of 10 times a second. The timer, actuated by the control, can cycle 6 times a second. The timer controls an air solenoid valve which activates the solder application gun. The increased dispensing rate adds to the existing savings in labor, overhead and material costs of this paste soldering technique. (Fusion Engineering)

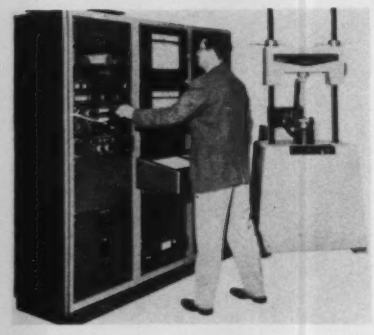
For more data circle No. 51 on postcard, p. 165



Piercing and Blanking Press Handles Aluminum

Designed for production runs of piercing and blanking of aluminum, a welded-steel double-crank press offers high rigidity and strength of frame. Its capacity near bottom of the stroke is 500 tons. The double-back-geared, twin drive, unit operates at 30 strokes per minute. Distance between housings to clear is 240 in. Area of the slide is 72 x 240 in. with a stroke of 12 in. It requires about 130 x 288 in. of floor area, and weighs about 220,-000 lb. The setup is equipped with a pneumatic clutch and brake with electric clutch control. (The Federal Machine and Welder Co.)

For more data circle No. 52 on postcard, p. 165



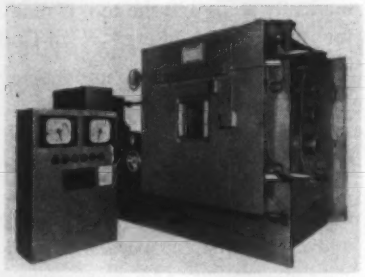
New Materials-Test System Uses Programming

Consisting of several integrated components, a new materials-testing setup simultaneously programs and applies rapid variations of temperature and load or strain. At the same time it separately records temperature, load, and strain with respect to time, as well as load vs. strain directly. Applied force on the loading frame is variable from —10,000 to +10,000 lb, at rates up to 5000 lb per second. Ram velocity is controllable from 0 to 1 ips. Two synchronized function generators translate pencil - drawn program charts into operating control signals. Program duration is adjustable from 10 to 300 seconds. (Research, Inc.)

For more data circle No. 53 on postcard, p. 165

Test Chamber

Designed to simulate conditions which might be encountered by outer-space vehicles, a new environmental test chamber has a temperature range from —100° to +1000°F. Radiation from all six sides, as well as by convection,

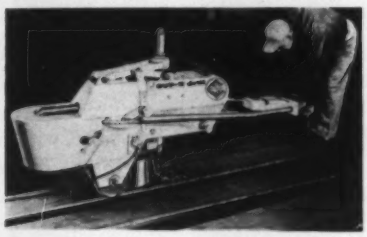


reproduces high-altitude conditions completely around the test specimen. At any temperature and at any altitude, the gradient throughout the chamber can be held as closely as ±5°F. (The American Research Corp.)

For more data circle No. 54 on postcard, p. 165

Portable Drill

For heavy structural shapes and other heavy metal drilling, a portable drill reams, drills, or countersinks up to 1½-in. diam holes. Only one man is required for operation. Special features include:



a one-ton holding magnet for positive positioning, hole accuracy, and maximum drill-point pressure; lowest possible center of gravity; and stainless-steel body. The drill weighs 730 lb. (Guibert Steel Co.)

For more data circle No. 55 on postcard, p. 165

Cushioned Abrasive

A semi-firm, rubber-cushioned binder represents a major development in the compounding of rubber-cushioned abrasives. The manufacturer claims the new binder rounds out the only complete, comprehensive stock line of such abrasives for use in metalworking and in the finishing of many items in wood, glass, plastics and laminated materials. (Brightboy Industrial Div., Weldon Roberts Rubber Co.)

For more data circle No. 56 on postcard, p. 165

Insertion Tool

A miniature, automated inserting-tool, for high-speed installation of wire-thread inserts, is capable of driving up to 1200 inserts per hour. The new hopper-feed and lightweight gun combination is designed specifically for automated assembly-line operation, in any type or size of material where high-loading strength and resistance to wear are required in tapped holes. Weighing only 18 oz, the gun can be remotely operated up to 8 ft away from the hopper-feed mechanism. In operation, a foot-actuated switch ejects an insert from the hopper mecha-

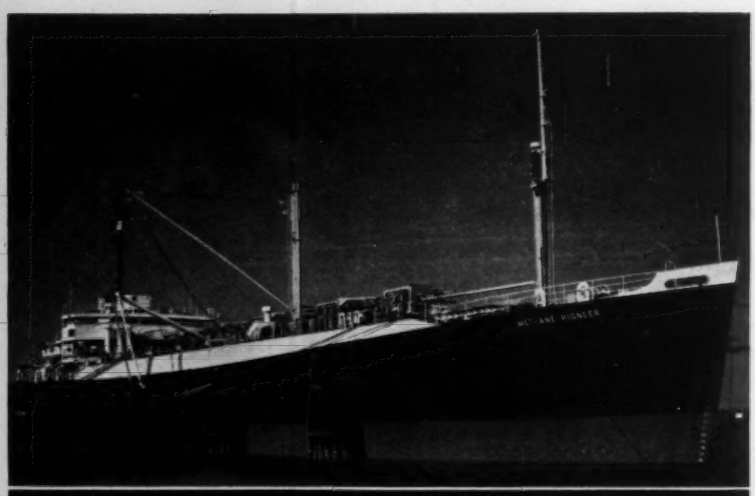
Stamco

slitting and coiling line saving time and material in west coast installation

UTILITY APPLIANCE CO., of Los Angeles now has line to handle 20,000 lb. coils up to 48" wide and gauges up to ⅛ inch. Low investment—long life—make this a wise move toward reducing operating costs.

Stamco, Inc., New Bremen, Ohio, U.S.A.

Slitting and Coiling Lines • Cut-To-Length Lines • Flying Shear Lines • Power Squaring Shears • Automatic Resquaring • Corrugating • Culvert • Steel Mill Equipment



Job report courtesy of Conch Methane Co., Ltd.

when pipe joints must be completely dependable at minus 258°F

The engineers who successfully "broke through" the problem of handling liquefied methane gas on and off the "METHANE PIONEER" at minus 258°F had to "play it safe" in every respect. To provide unquestionably *safe* stainless pipe joints, Arcos EB Consumable Weld Inserts were used to make the important root passes.

EB Inserts permit welding to be done from one side only. They eliminate back-up ring obstruction and produce a smooth inside contour to expedite gas flow. If you are not familiar with the advantages of EB Weld Insert for "tough" pipe joining problems, write ARCOS.

*Trademark of General Dynamics Corp.

WELD WITH ARCOS

EB* WELD INSERT

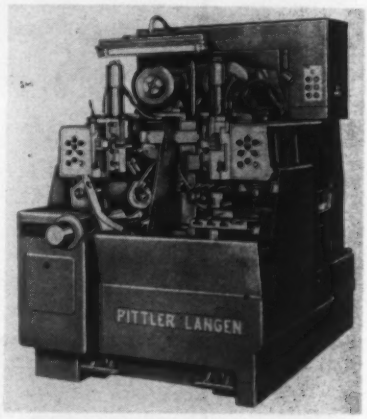
ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

nism through a nylon tube to the inserting-tool tip. Then the operator simply presses the tool forward against the tapped hole. When the insert is fully installed to a preset depth, the driving mandrel automatically stops and the tool is ready for the next insert. (Heli-Coil Corp.)

For more data circle No. 57 on postcard, p. 165

Automatic Chucking

An automatic, two-spindle chucking machine for economical internal and external front-operation finishing of castings, forgings, gears, wheels, flanges and bevels suits production and short runs. The spindles, independently driven by their own 13.5-hp motors, have



eight working speeds each. The left-hand spindle is provided with a turret slide having three index positions for close-tolerance boring. A separate program-controlled compound slide does longitudinal and transverse cutting at any desired contour. (Cosa Corp.)

For more data circle No. 58 on postcard, p. 165

Special End Mills

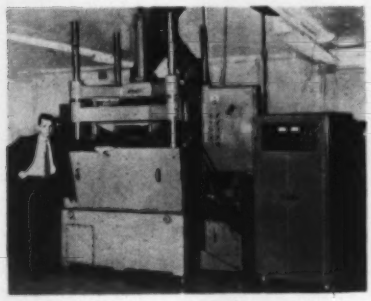
Introduced to the metalworking industry only within the past year, the success of the Thriftmill has been so phenomenal, the manufacturer last month added a two-flute, double-end model to the line. Now, to meet the increasing costs of metalworking, a double-end, four-flute model is being introduced.

Each Thriftmill, ground from solid, high-speed steel, produces faster and more efficiently and costs up to 20 pct less than conventional end mills. (Cutting Tool Div., Brown & Sharpe Mfg. Co.)

For more data circle No. 59 on postcard, p. 165

Discharge Machining

A new roughing power supply, in conjunction with any standard machine of the maker, has an optimum metal-removal rate of 20 cu in. per minute. While the maximum removal rate is standard for most

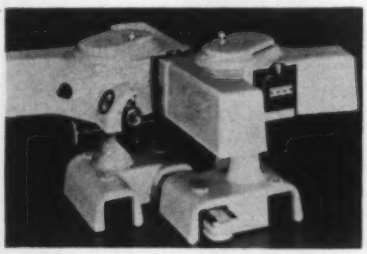


types of die steels, the rate can be adjusted from a minimum rate of 1 cu in. per minute throughout the full range of 20. (Elox Corp. of Michigan.

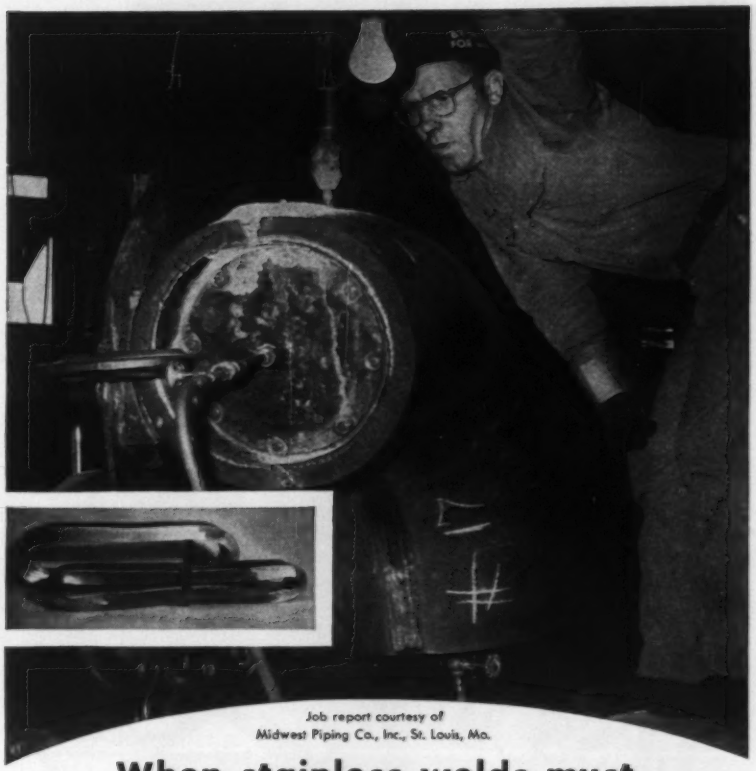
For more data circle No. 60 on postcard, p. 165

Monochromator

Providing unusual versatility, a large-aperture monochromator and spectrometer has available a wide range of easily and accurately interchangeable prism systems. These prism systems cover the ultra-violet, visible and infra-red regions of



the spectrum. The light-gathering power of the instrument is very good, and there is no vignetting at any position of the prism. The base is made so that the monochromator can be used as a table model, or fitted on an accessory bar. Two of the instruments can be mounted

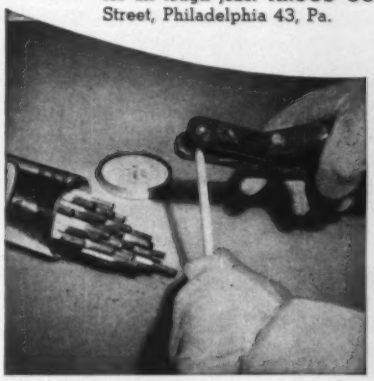


Job report courtesy of
Midwest Piping Co., Inc., St. Louis, Mo.

When stainless welds must pass the most rigid tests possible

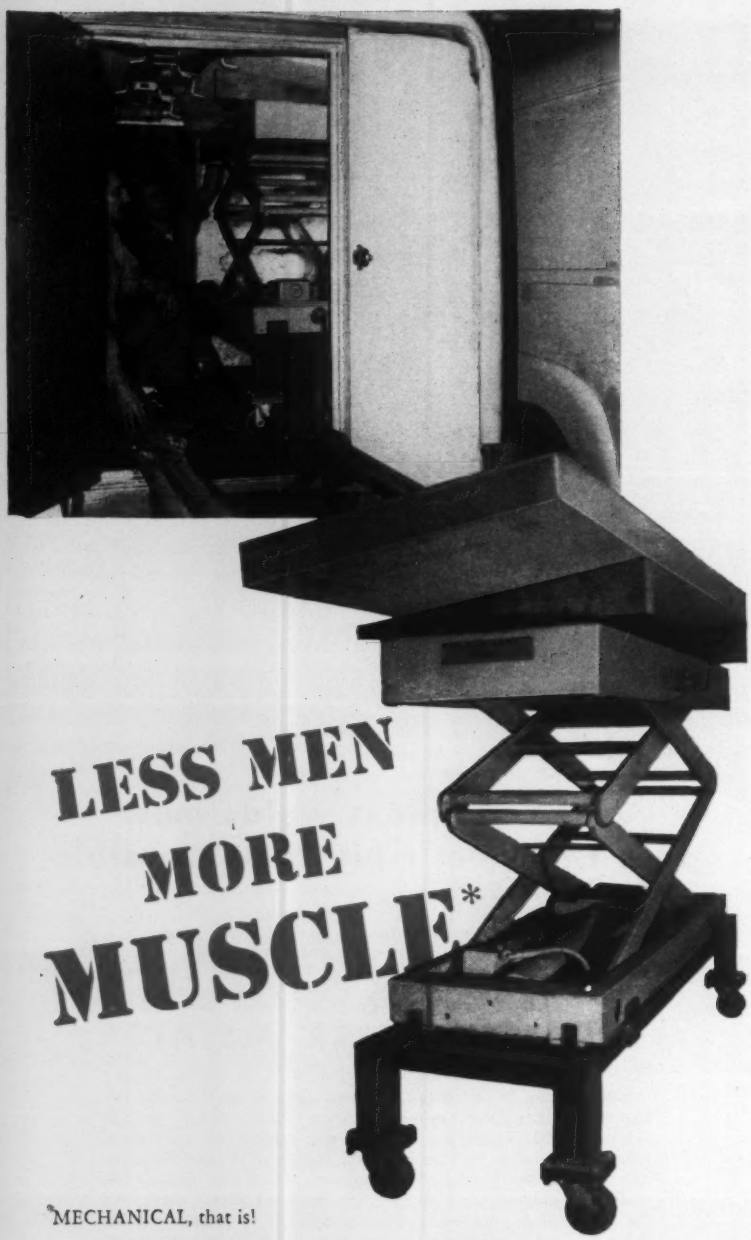
USE ARCOS QUALITY FILLER METALS

This 16" diameter Type 304 stainless elbow is part of the reactor cooling system in an atomic powered ship. In welding the two halves, the first pass was made with Arcos Chromend K (Type 308) electrodes. The balance of the joint was submerged arc welded with Arcosite Bonded Flux and Chromenar K (Type 308) wire. The inset shows results of a dramatic test of the Arcos weld metal so produced. A 2½" ring, cut from an elbow, was given the normal bend test—and then completely flattened—without a crack! Such performance is the reason why Arcos is preferred for all tough jobs. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.



Arcos Chromend K
(Stainless) Electrodes

Arcos Chromenar K Bare Wire
and Arcosite Bonded Flux



LESS MEN
MORE
MUSCLE*

*MECHANICAL, that is!

It once took *eight* strong men to jockey each of two cold-hold units and install them in the roof of a refrigerated truck at Metropolitan Body Company, a subsidiary of International Harvester Company. Now *two* men do the job more safely and more quickly . . . releasing valuable labor-time for more productive application.

This is typical of how the mechanical muscles of a Southworth Lift Table† solve materials handling problems in industry after industry. The Model LH 2-57S illustrated has a load capacity of 1,000 lbs., a reach of 57". Why not talk to a Southworth engineer about increasing the efficiency of work positioning in *your* plant? Write or call:

†PATENT PENDING

SOUTHWORTH MACHINE CO. since 1890

SOUTHWORTH LIFT TABLES

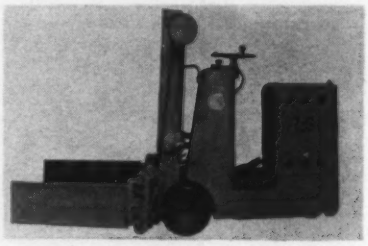
a division of SOUTHWORTH MACHINE CO., 548 Warren Ave., Portland, Me.

together so as to function as a double monochromator. (Engis Equipment Co.)

For more data circle No. 61 on postcard, p. 165

Fork-Truck Arms

Adjustable rubber-faced clamping arms are provided on fork-truck attachments for handling different sizes of smooth-sided boxes and crates. Ruggedly designed, these attachments offer versatility plus economy in handling operations.

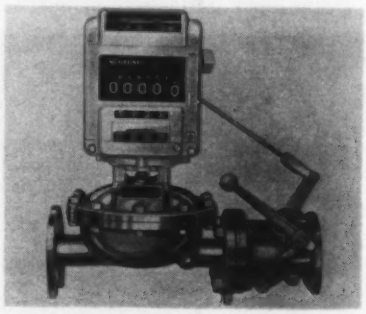


Opening range is from 11⅝ to 59⅜ in. The attachments, when added to standard-power equipment, enable palletless handling of boxes, crates, tote boxes and other smooth-surfaced loads. (Lewis-Shepard Products, Inc.)

For more data circle No. 62 on postcard, p. 165

Auto-Stop Meter

A new 1½-in. stainless steel meter provides controlled measurement of predetermined quantities for batching and processing systems where corrosive liquids—such as acids and alkalis—are used. The



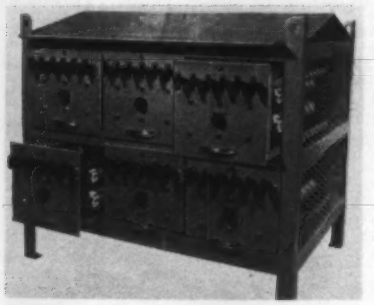
new meter functions almost automatically. All the operator has to do is press buttons on the register face to set the quantity and open the valve. The liquid flows unattended until the preset quantity is reached; then the valve automatically cuts off

flow. During delivery, the operator is free to devote his attention to other details. (Neptune Meter Co.)

For more data circle No. 63 on postcard, p. 165

Welding Controls

An improved line of arcwelding control units are available in compact, lightweight six-operator, four-operator and two-operator models. In addition to dc metallic arcwelding with coated electrodes in all positions, the units may be used for other types of electric arc-welding,



including the gas-shielded, tungsten-arc and consumable-electrode processes. Switches on the front of each drawer in the unit make it easy for each operator to vary the current in steps as small as 1 amp for accurate welding control. (J. B. Nottingham & Co., Inc.)

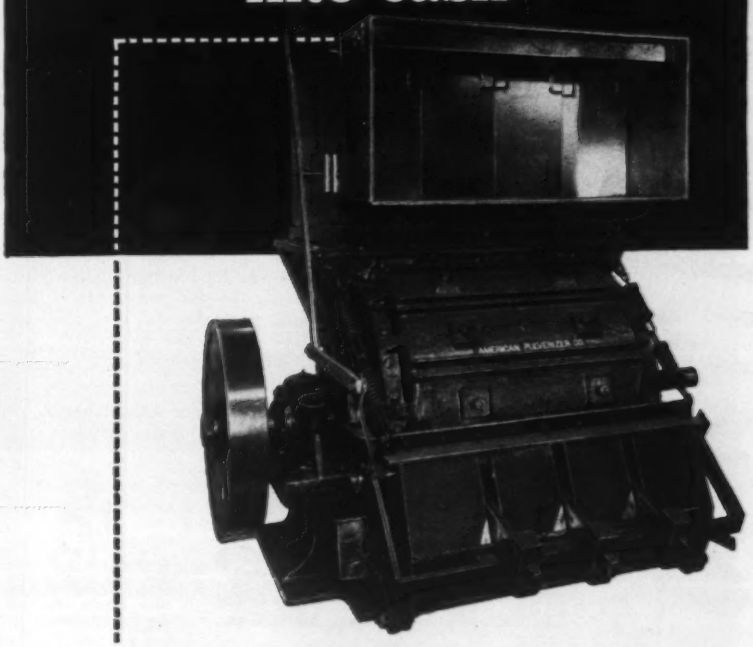
For more data circle No. 64 on postcard, p. 165

Cutting Torch

A natural-gas cutting torch can slice through 30 in. of metal in a single pass. It has the largest gas flow—up to 3000 cfh of oxygen and 250 cfh of natural gas—and the widest cutting range of any existing

natural-gas, hand-cutting torches. It handles every manual cutting job encountered in factories, foundries, steel mills, fabricating shops, and scrap yards. It's ideal for removing large risers. Special applications

convert metal turnings into cash



Long, curly, troublesome metal turnings, reduced in an American Metal Turnings Crusher, can produce additional profits for your plant.

Reduced to chip form, metal turnings bring $2 to $5 more per ton. Handling metal chips by shovel or pneumatic systems is easier, too, and chips require 75% less storage space than bulky machine turnings. You'll recover more cutting oil from chips . . . up to 50 gallons per ton! More important, American Metal Turnings Crushers pay for themselves and produce substantial profits for years to come. Models available with capacities ranging from 1 to 50 tons per hour. To get all the details, write American today.

reclaim fused welding flux

One industrial plant saved more than $10,000 a year by using an American Welding Flux Crusher to regranulate fused welding flux. Write American for details.

American PULVERIZER COMPANY

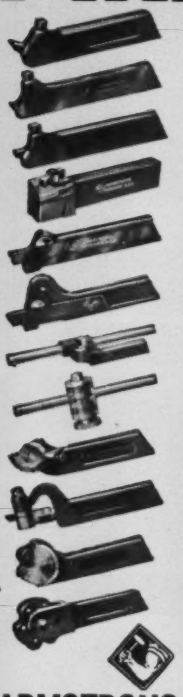
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

1439 MACKLIND AVE. SAINT LOUIS 10, MISSOURI

ARMSTRONG

TOOL HOLDERS

A Correct Tool for Every Lathe Operation



You can save time (and money) by ensuring that your machine tools are equipped with *adequate numbers* of the correct ARMSTRONG Tool Holders. The ARMSTRONG System of Tool Holders includes correctly designed tools for *every* standard operation on lathes, shapers, and planers, and for many operations on turret lathes and screw machines. By utilizing the ARMSTRONG System of Tool Holders, you can reduce tooling costs, eliminate down time in tooling up, operate your machine tools at maximum feeds and speeds.

ARMSTRONG Tool Holders are long-lasting tools. They are strong beyond need, handy and efficient, profitable to use, and are readily available from your local ARMSTRONG distributor.

Check over your ARMSTRONG Tool Holder Needs. Write for literature.

If you do not know the name of your local ARMSTRONG Distributor, inquire when asking for literature.

ARMSTRONG BROS. TOOL CO. 5209 W. ARMSTRONG AVE. CHICAGO 46, ILL.

MOTORIZED

COIL LIFTER

SAVES STORAGE SPACE...

HANDLES COILS FASTER ... SAFER

1 Lifter Handles Both Wide and Narrow Coils With Same Speed and Economy

This C-F Coil Lifter, under control of the Crane operator handles hundreds of coils a day in a large mill ... wide, narrow, and of varying tonnage. Fast, infinite adjustments of the motorized legs permit quick pick-up and set-down. Legs can be opened to any width and held ... no need to open to maximum width to handle narrow coil. Maximum of 12" required between coils of any width—saves storage room.

Positive tong grip on coil tightens as lift is made ... insures safe handling. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for Bulletin and complete information.

CULLEN-FRIESTEDT CO.

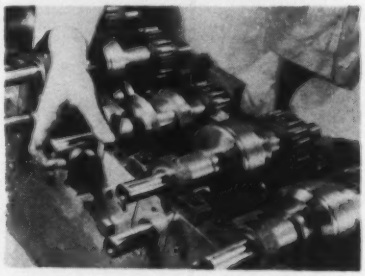
1303 South Kilbourn Avenue • Chicago 23, Illinois

such as gouging, rivet piercing, and pad and fin washing are also handled with ease with the new torch. (Linde Co., div. of Union Carbide Corp.)

For more data circle No. 65 on postcard, p. 165

Rapid Roll Changeover

Removable station arrangements applied to a basic cleat-rolling machine chassis permit rapid changing of rolls without major dismantling of the machine. This arrangement cuts set-up time to a

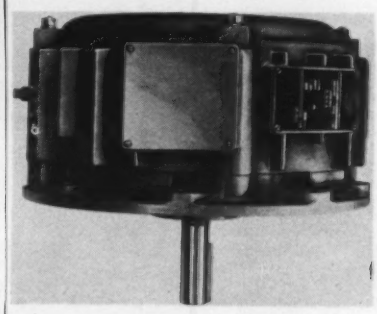


minimum when frequent changes are desired. It can be furnished for standard width machines or for machines which have been widened to any width up to 13 in. on the inboard side. (The Lockformer Co.)

For more data circle No. 66 on postcard, p. 165

Flat-Type Motors

While flat-type motors are primarily for such machine-tool applications as turret lathes, punch presses, drill presses and milling machines they have found numerous other uses where small size and



lightweight are primary requirements. In addition to machine-tool uses they have been applied to numerous other equipment drives, including pumps, oil burners, exhaust systems, conveyors, food machinery

and packaging machines. Some models are reported to weigh less than half as much as equal-horsepower conventional NEMA Design B motors, and are as much as 48-pct shorter. (Howell Electric Motors Co.)

For more data circle No. 67 on postcard, p. 165

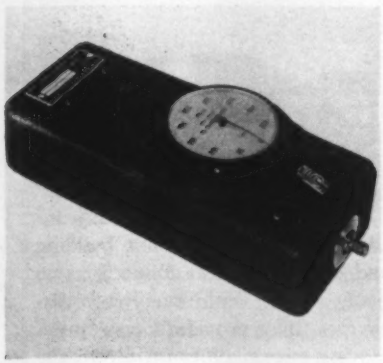
Machinery Control

A power-machinery control incorporates an automatic device that provides greater safety for the operator of power machinery by eliminating the possibility of accidental injury. Used to control the operation of punch presses, power shears and molding presses, the control permits operation by any one of five methods: foot switch; one hand non-automatic; one hand automatic; two hand non-automatic and two hand automatic. Choice of operating method is accomplished by turning a selector knob, located inside the control box. An indicator light shows which method has been selected. To enforce safety precautions, the control box is equipped with a lock and key so that the method selection cannot be changed without the knowledge of a responsible person. (Protectomatic, Inc.)

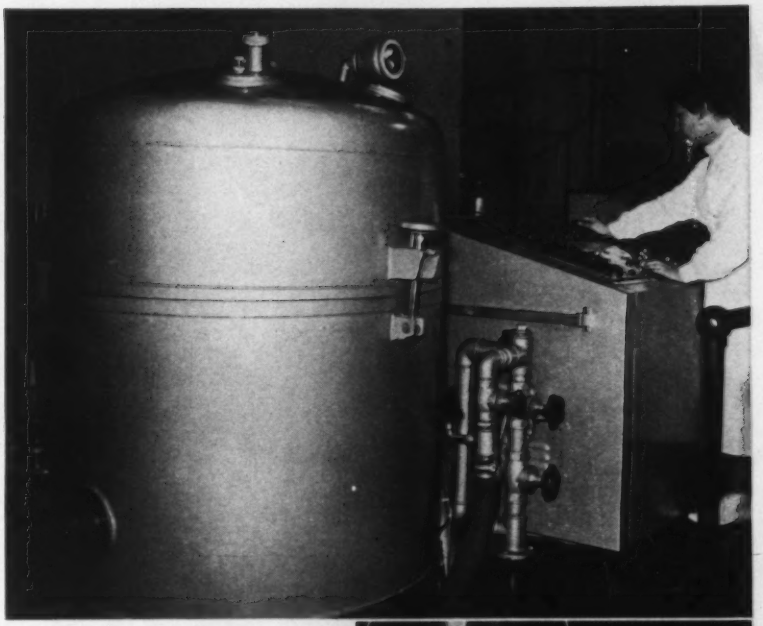
For more data circle No. 68 on postcard, p. 165

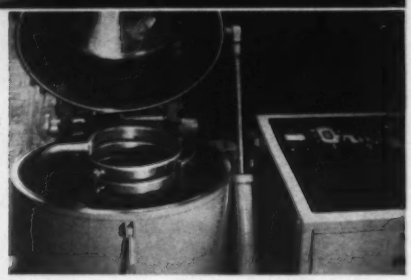
Mechanical Force Gage

Precision force gages measure tension in permanent test setups. Each force indicator's free-floating transmission rod, which transmits the tensile load to a dial indicator,



is threaded at its end for mounting in a test apparatus or in fixtures. Threads are standard 5/16-18. These force gages are available in





Sinter in Vacuum up to 3,000° C!

Water-cooled, wear-free induction coils produce electro-magnetic field for fast, uniform heating.

Centigrade, notice, not Fahrenheit. This temperature has many times been achieved, and maintained, under laboratory conditions with Heraeus Induction Sintering Furnaces. In production, temperature range of 2,600°C to 3,000°C is typical.

More significant, these Heraeus furnaces improve end product quality while cutting operating costs. You get uniform heat distribution . . . faster heating . . . and longer element life . . . than with any other vacuum furnace on the market today.

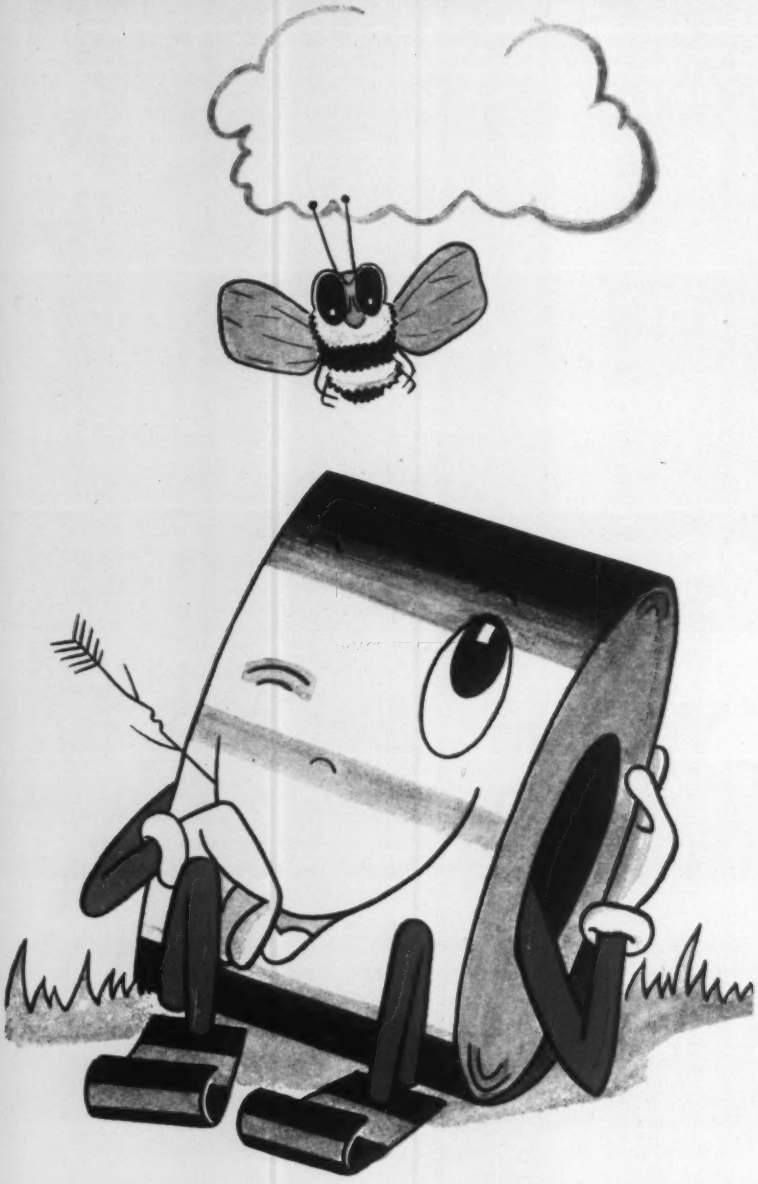
There's a complete line to meet your needs, with coil diameters from 6¾" to 20½" . . . with choice of pumping systems for working pressures from atmosphere down to the 10^{-5} range. Each gives you complete facilities for the widest range of vacuum metallurgy: sintering, reactive work, degassing, purification of metal powders, brazing, annealing, hardening. Each saves the high cost of constantly replacing the expensive elements required in resistance heating.

Find out more about higher quality work, lower operating costs. Write for Bulletin 4-25.

Consolidated Vacuum Corporation

ROCHESTER 3, NEW YORK

HIGH CARBON STRIP



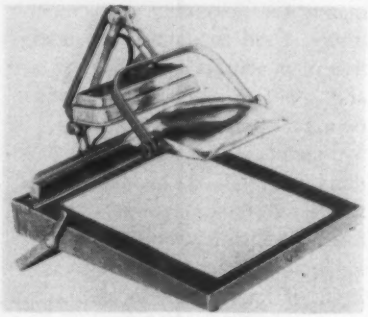
PETERSON
STEELS, INC.
THE 52100 HOUSE
UNION, NEW JERSEY · WETHERSFIELD, CONNECTICUT
DETROIT, MICHIGAN · MELROSE PARK, ILLINOIS

capacities of 20, 50, 75, 100, 150, 200 and 500 lb. (Hunter Spring Co., a div. of American Machine & Metals, Inc.)

For more data circle No. 69 on postcard, p. 165

Magnifying Viewer

Featuring a 6- by 6-in. optically-ground acrylic lens, an illuminated magnifying viewer permits three-dimensional viewing. Two 4-w fluorescent tubes highlight the

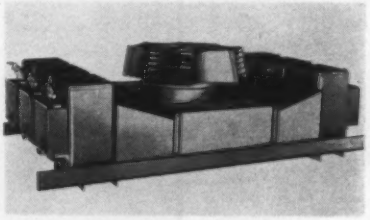


working area. A soft diffused underlighting is provided by two recessed 8-w fluorescents under the viewing-table base. (Fostoria Corp.)

For more data circle No. 70 on postcard, p. 165

Heater Assemblies

Gas-fired, duct-heater assemblies for complete or supplemental heating of industrial and commercial buildings consist of two, four, or six gas-fired duct heaters, a plenum chamber, a motor-driven fan and a fixed or revolving discharge. The self-contained units need little vertical space. They may be mount-



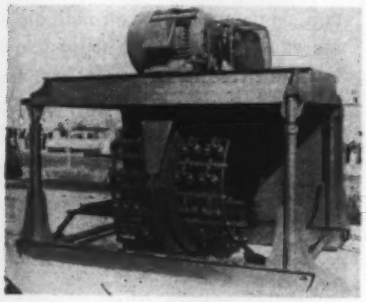
ed in the truss area of a building and they require no connections to duct work. With revolving discharges, they provide a constantly-moving stream of warm air to the floor. The air flows around and under columns, machines, stacked materials and other obstructions. This provides even heating without

hot or cold spots. The units are available in five sizes with output capacities ranging from 368,000 to 1,104,000 btu per hour. (L. J. Wing Mfg. Co.)

For more data circle No. 71 on postcard, p. 165

Pipe-Cleaning Machine

Capable of cleaning 24- through 42-in. pipe, the world's largest pipe-cleaning machine weighs 20,000 lb. Dimensions are 8-ft, 9-in. wide, 9 ft high (not including motor housing) and 9-ft, 4-in. long. Actual cleaning is performed by rotary-cup cleaning brushes. While rotating around the pipe, each set of two brushes operates in a counter-

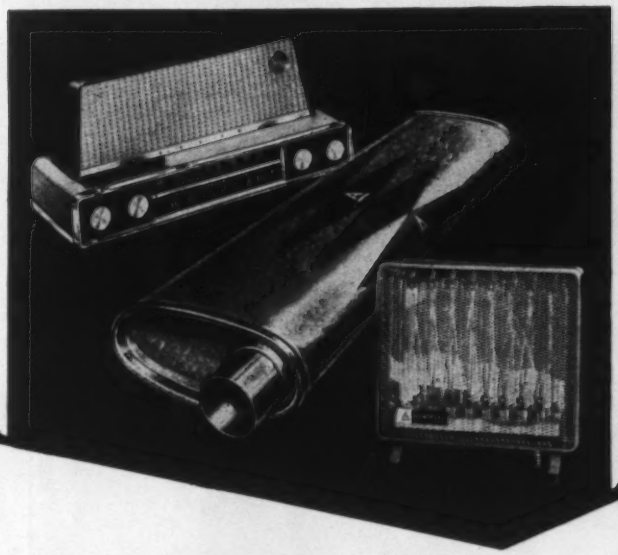


rotating manner. Tests show that these counter-rotating brushes get pipe cleaner, more efficiently than other methods. The brushes are held at an angle to the pipe to actually dig into the surface and remove all scale, dirt, laquer and other foreign matter. (Remco Mfg. Co.)

For more data circle No. 72 on postcard, p. 165

Pressure Boosters

Boosting ordinary compressed air (80 psi) up to 3000 psi hydraulic pressure without the use of any additional power or need for pumps or motors, a new line of air-hydraulic boosters provides an economical, convenient means of stepping up power for multi-purpose production uses. As pressures increase, the seal effectiveness increases with the manufacturer's multiple-lip, self-energizing seals designed to effect a trouble-free positive seal with minimum friction and maximum efficiency. The simple, compact design of the booster saves space and permits its use for powering such equipment as spot welders,



at Arvin Industries, too...

FEDERAL-WARCO

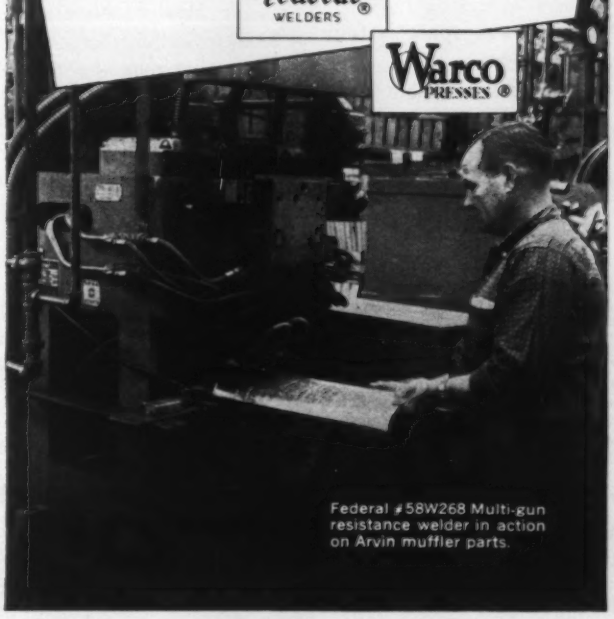
High volume producers of precision metal products, Arvin Industries consistently get highest quality welds with Federal Multi-gun, automatic resistance welders.

Arvin quality control experts, like those of other leading metal fabricators across the country, know they can rely on Federal resistance welders and Warco mechanical presses to maintain quality and still meet highest production quotas. Precision-engineered to your requirement by:

THE FEDERAL MACHINE AND WELDER COMPANY
Warren, Ohio

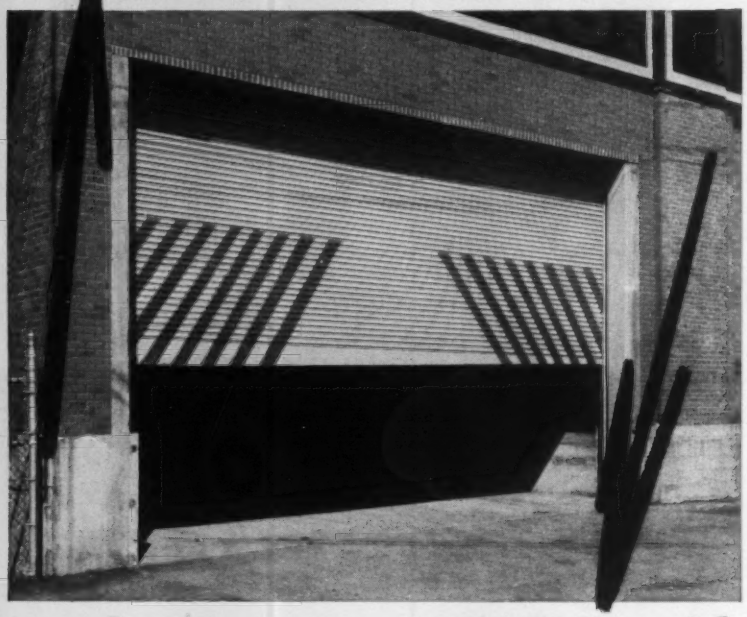
Federal® WELDERS

Warco® PRESSES



Federal #58W268 Multi-gun resistance welder in action on Arvin muffler parts.

UP goes door efficiency –



as door costs go DOWN, with

Kinnear Rolling Doors

The *coiling upward action* of Kinnear Rolling Doors saves time, manpower, and money!

The curtain of interlocking steel slats, *originated* by Kinnear, provides *vertical* door action at its very best!

All floor and wall space is fully usable at all times.

Even ceiling areas remain completely clear; leaving maximum room for use of hoists, lift trucks, and similar equipment.

When closed, the doors form all-metal barriers against wind, weather, intruders, and vandals.

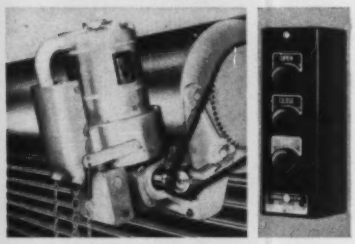
Steel or Aluminum

Kinnear Rolling Doors are made of steel, aluminum, or other metals. Built to fit any opening in old or new buildings. Motor, manual, or mechanical control.

Steel Doors Heavily Galvanized

Heavy, hot-dip galvanizing gives Kinnear's steel doors lasting resistance to corrosion and the elements (1¼ oz. of pure zinc per sq. ft. of metal, ASTM standards). Kinnear Paint Bond makes them ready immediately for thorough coverage and adherence of paint.

Write for full details on Kinnear Rolling Doors.



Kinnear Power Operators give time-saving, push-button control of Kinnear Rolling Doors — from a single point or any desired number of convenient locations.

The KINNEAR Mfg. Co.
FACTORIES:
1760-80 Fields Ave., Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.
Offices and Agents in All Principal Cities

KINNEAR
ROLLING DOORS
Saving Ways in Doorways

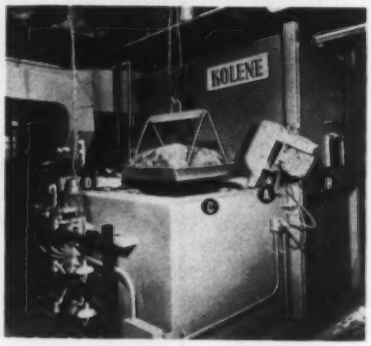
NEW EQUIPMENT

C-frame riveters, hydrostatic-testing equipment, workholding fixtures and bench or arbor presses. Easy to install, the booster ties in quickly to any handy air line and requires no complicated piping or expensive valves or controls. It can easily be moved from one machine to another to meet changing production needs. This adds to its value as an efficient production tool. (The S-P Mfg. Corp.)

For more data circle No. 73 on postcard, p. 165

Sludge-Removal System

A side-zone, sludge-removal system, engineered into salt-bath cleaning equipment, makes it possible to maintain continuous, uninterrupted, 24-hr cleaning, descaling or paint stripping operations—with no costly



shut-down time for salt-pot cleaning. This feature, which has been built into numerous units in a wide range of capacities, can also be added to existing equipment. (Kolene Corp.)

For more data circle No. 74 on postcard, p. 165

Band-Saw Blades

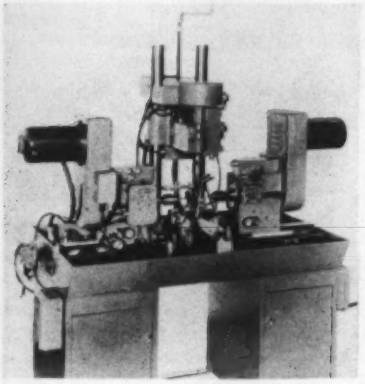
Harder teeth, tougher bodies and more uniform full-blade flexibility are reported to add up to 300 pct longer life to new high-speed steel, metal-cutting band saws. Developed especially for heavy-feed, high-speed production cut-off work on ferrous metals, these welded-together band saws are said to be the products of a radically new metallurgical approach. The manufacturer bases claims of increased durability on an entirely new high-speed

steel analysis, improved production methods, closer heat-treating control, stronger welds and more exacting 100-pct inspection. (Heller Tool Co.)

For more data circle No. 75 on postcard, p. 165

Triple-Spindle Unit

A high-speed, fully-automatic, triple-spindle machine drills, taps and threads. This versatile machine speeds production of secondary operations on screw-machine and headed parts, die castings, stampings and molded plastic parts. It has two horizontally opposed spindle units and one vertical spindle unit. Each unit can be cycled individually and automatically, in any combination with the other two units. This allows a varied sequence to suit individual jobs. Each unit has an individual spindle-drive motor with speeds ranging from 500 to 10,000 rpm. Dove-tail mounting permits 11 in. major adjustment of individual heads plus 2½- in. of spindle-stroke control. (Universal-Automatic Corp.)



For more data circle No. 76 on postcard, p. 165

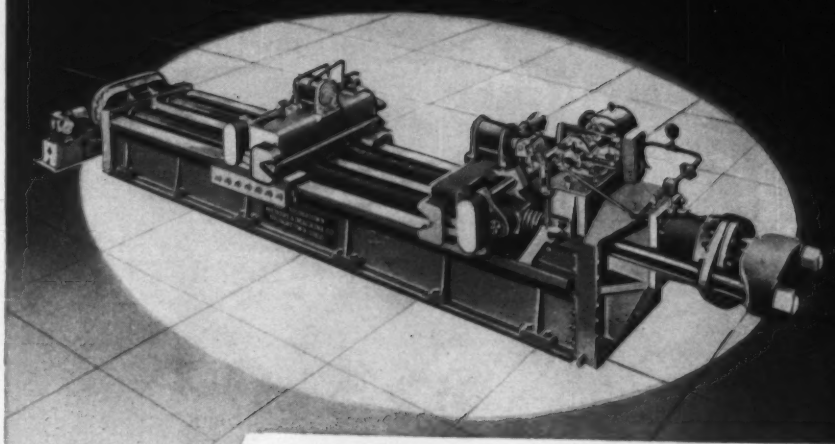
Automatic Pelleting

The major advantage of automatic-pellet mill operation is that it permits a machine to utilize full horsepower and run at optimum temperature without danger of plugging. Under manual operation, there's a tendency to keep the motor load just slightly below the rated load to avoid excessive current draw and to operate at a temperature somewhat below the critical mark to avoid plugging. Automatic-pellet

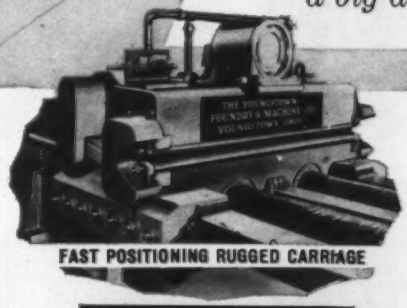
"YOUNGSTOWN"

New Carriage-Type Design

STRETCHER LEVELER



a small difference in design makes a big difference in RESULTS...



FAST POSITIONING RUGGED CARRIAGE

- *CONSERVES VALUABLE FLOOR SPACE*
- *SPEEDS STRETCHING OPERATION*
- *AIDS QUALITY CONTROL*

WEDGE TYPE HEADS with WAFFLE TYPE GRIPPER JAWS assure flatness of sheet-ends.

Rugged Three Way fabricated Steel Bed insures utmost rigidity

The Hydraulic Stretcher Leveler pictured is 800,000# Capacity capable of stretcher leveling mild cold rolled sheets 30″ to 62″ wide, 30″ to 168″ long, up to .180″ thick in either single or multiple sheets.

A complete range of sizes . . . built from 10,000# for aluminum extrusions to 2,000,000# for stretching plate. New performance throughout a long life of service is assured by traditional "YF&M" rugged construction. Write for Complete Information.

The Youngstown Foundry & Machine Company

Serving Industry Since 1885

Youngstown 1, Ohio

that's what you want in a fuel...

what you get in B&O Bituminous!

Sure, bituminous coal is power-packed—it's prepared to suit any industrial utilization—its source is most convenient to industry. But, bituminous gives you the *extra* that no other fuel can—*nearly inexhaustible reserves, always available!*

B&O BITUMINOUS COALS FOR EVERY PURPOSE

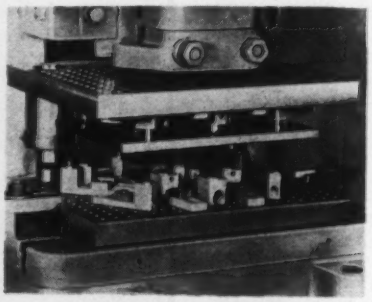
Ask our man! BALTIMORE & OHIO RAILROAD
BALTIMORE 1, MD., Phone: LExington 9-0400

mills are designed to operate, after manual start-up, without requiring the attention of an operator. (Sprout, Waldron & Co., Inc.)

For more data circle No. 77 on postcard, p. 165

Punches and Dies

A new adjustable punch and die program enables the user to economically punch a number of holes of varying size and shape in one operation and reuse the tooling over and over again. Basic elements

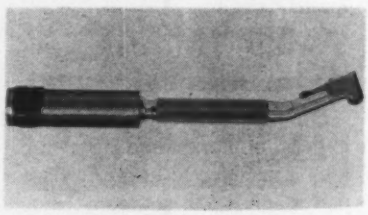


in this program are special die sets on which punch and die holders can be arranged—by means of a template—into a variety of hole patterns. (O'Neil-Irwin Mfg. Co.)

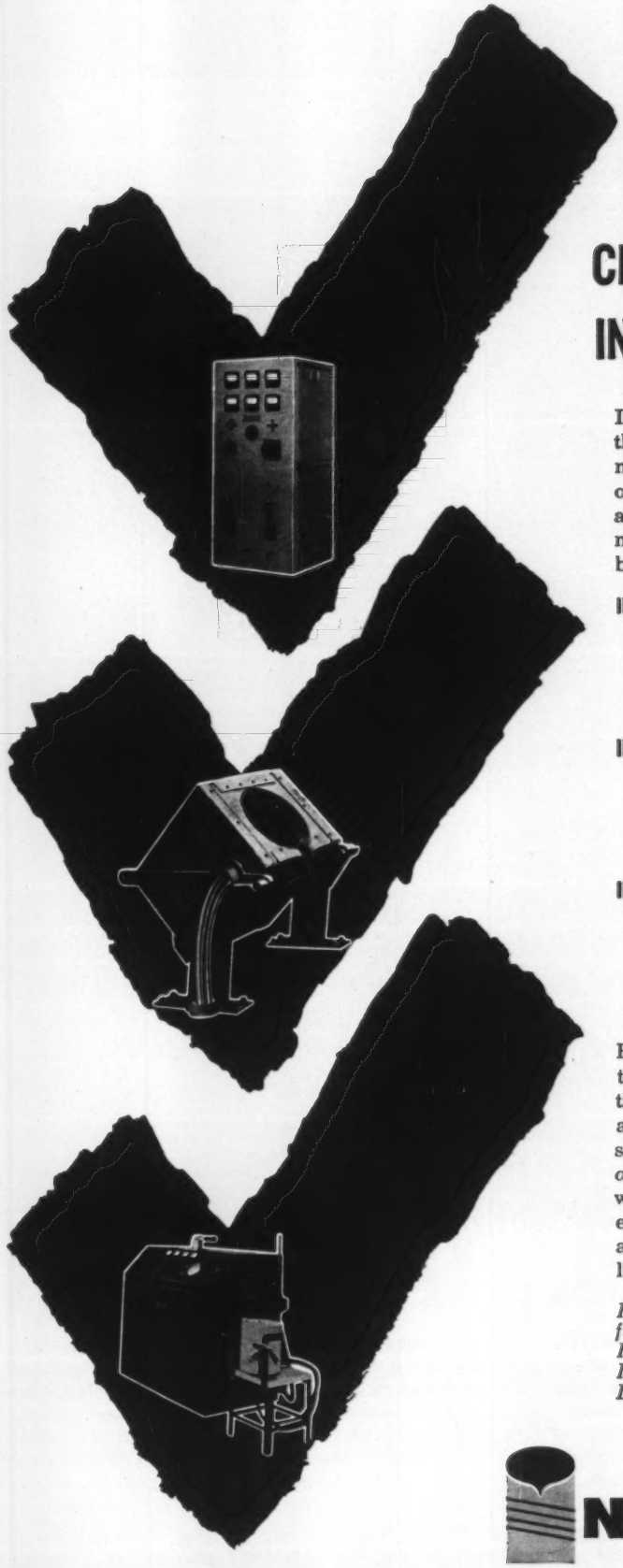
For more data circle No. 78 on postcard, p. 165

Angle-Type Handpiece

Small and lightweight—6¼ x ⅝ in., and only 4 oz—an angle-type handpiece resembles a dentist's drill. And like a dentist's tool it is ideal for reaching difficult and otherwise inaccessible spots. It's sturdily built, however, for industrial work and meets the exacting needs of the elec-



tronic and instrument industries as well as metalworking, especially in tool, die and mold work. The handpiece has a latch-type tool holder, hardened steel gears and chromium finish. Equipped with two mandrels, it can be used with standard unmounted accessories and very



CHECK THE BIG CHANGES IN INDUCTION MELTING

In just seven years, Inductotherm has changed the face of induction melting with a barrage of new ideas. Some have resulted in lower costs . . . others have simplified operation, maintenance, and installation. But all have been aimed at making induction melting more useful, and a better buy, than ever before.

IDEA #1 . . . *Packaged Controls:* By shrinking the size of capacitor banks to permit behind-the-panel mounting, Inductotherm was able to introduce the first pretested, prewired melting furnace controls in induction history.

IDEA #2 . . . *Integral Power:* M-G set, starter, transformer and capacitors were first packaged as a compact movable unit in the melting control console of the Inducto "Integral" series, which now includes capacities up to 100 KW.

IDEA #3 . . . *Design Innovations:* Inductotherm has consistently been first with new features in furnace design. Tilting furnace power feed through the trunions is one example, Heliarc welded furnace construction is another.

But these ideas barely scratch the surface. For the greatest innovation has been the Inductotherm concept of service. Not just fast repairs and overnight replacement of parts (even M-G sets) . . . but a basic concept: *Inductotherm is out to fit induction melting to your needs.* We will make every possible effort to improve our equipment and the induction technique, never asking you to trim your requirements to the limitations of our equipment.

If you'd like more information on Inductotherm furnaces, write for Bulletin 70. But, for a taste of Inductotherm service, ask to have an engineer call. Inductotherm Corporation, 412 Illinois Avenue, Delanco, New Jersey.

INDUCTOTHERM

STEEL

STEEL pipe is a way to carry things. Gas, water, chemicals, oil. Wires, cords, cables, voices . . . these and a thousand others. Steel is pipe laid deep in the earth. A connection through the air between two points. Sometimes you see it, more often you don't. Youngstown, world's second largest pipe producer, makes tubular goods in virtually hundreds of sizes and strengths. Pipe to carry things. Pipe to protect, pipe to build with. Pipe ringed by the Orange Bands of Youngstown, pipe from a growing force in steel.

OIL

STEEL is pipe for drilling 1000 oil wells a week. It is casing and tubing. In the oil fields, there is no more widely known mark of quality than the Orange Bands of Youngstown. Through its Continental-Emsco supply division, Youngstown offers a drilling equipment source second to none. Through its modern tubular research center and through its engineers (largest service group in the oil fields), Youngstown offers help to solve your problems. You get satisfaction from Youngstown, a growing force in steel.

THE YOUNGSTOWN SHEET AND TUBE COMPANY, YOUNGSTOWN, OHIO.

Youngstown –

ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND COLUMBUS DALLAS DENVER DES MOINES DETROIT

HEAT PIPE

YOUNGSTOWN STEEL is seamless pipe for drilling oil. Continuous weld pipe for plumbing, heating and construction. It is electric weld pipe for transmission and distribution of gas and water. It is Youngstown's automated seamless mill rotary hearth, largest in the world. It is Youngstown's Campbell reduction mill stretching 7-inch OD pipe thirty feet long into 2-inch tubing one hundred and forty feet long. It is quality. It is service. Two well-known traditions which mark Youngstown as a growing force in steel.

YOUNGSTOWN STEEL is all kinds of pipe. It is pipe of carbon steel and Yoloy. It is Fibercast—plastic pipe to handle corrosive liquids at high temperatures. And you can get it through 28 Youngstown District Offices, 750 standard pipe distributors, 16 independent oil country suppliers and 153 Continental-Emsco stores and offices. Whatever your needs, wherever you are, name Youngstown pipe when you want quality and cost-cutting service. You get what you want from Youngstown, a growing force in steel.

growing force in steel

GRAND RAPIDS HOUSTON INDIANAPOLIS KANSAS CITY LOS ANGELES MILWAUKEE MINNEAPOLIS NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS SAN FRANCISCO SEATTLE TULSA WASHINGTON

Are you paying

5 TO 10 TIMES TOO MUCH FOR WELD INSPECTION

. . . . and not finding ***ALL*** *the cracks?*

If you are testing to routine specifications—or applying such specs—it is quite likely that you are paying an unnecessary high price. Certainly it is a possibility worth investigating!

With Magnaflux testing . . .

you can reliably inspect about 150 feet of linear welds per hour, at a cost of approximately 4.4¢ per foot of weld. This includes man-hour cost for two inspectors working at an *average* rate, plus the small cost of Magnaflux powder used.

For non-linear welds, your cost will be about 50% more—or roughly 6.6¢ per foot of weld, including normal cost and time for moving scaffolding.

Compare these costs with what you are paying now!

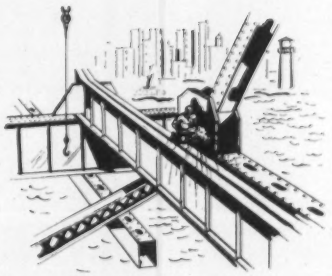
How reliable is Magnaflux?

It is the only recognized test proven completely reliable for finding all cracks open to the surface . . . however small or deep. These are the cracks that raise stresses dangerously and cause most of the failures in weldments.

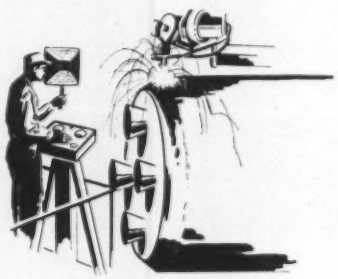
Many manufacturers of X-ray equipment frankly caution that X-ray may not find all these cracks. Yet, these very cracks are most important to find! Nor will *any other method* find them at a cost as low as Magnaflux.

None of this implies that Magnaflux testing eliminates all need for other test methods. Magnaflux *can* cut your testing costs and it *will* find many cracks other methods overlook, and the significant sub-surface defects, as well.

Shouldn't you investigate these savings now? Ask to have a Magnaflux Engineer detail the whole story—soon.

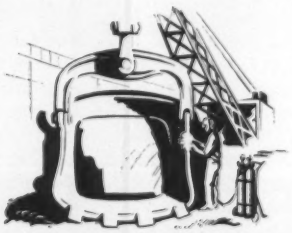


CONSTRUCTION: Bridges, buildings, etc. Magnaflux is proved out on important welds.



SPACECRAFT: Critical welds. Often several Magnaflux and other methods needed—on each weld.

OIL and CHEMICAL: For pipeline, reactor, or tank—welds proved crack-free.



HEAVY EQUIPMENT: Manufacture and Repair. Portable and low cost reliable tests.

MAGNAFLUX CORPORATION

A Subsidiary of General Mills

7302 West Lawrence Avenue, Chicago 31, Illinois

New York 36 · Pittsburgh 36 · Cleveland 15

Detroit 11 · Dallas 35 · Los Angeles 22

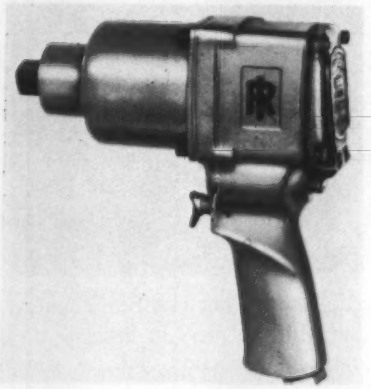
The Hallmark of Quality in nondestructive test systems

small dental-type burs, drills and abrasive points. (Foredom Electric Co., Inc.)

For more data circle No. 79 on postcard, p. 165

Impact Tool

An air-operated impact tool features 20 pct more power and 200 pct faster rundown. Designed for hard industrial service, this tool will handle work up to ⅝-in. bolts. In spite of its increased power and rundown speed, the new tool is 2¼-in. shorter than the tool it supersedes. This new tool is only



7¼-in. long, with a side to center distance of 1½-in. weighing only 8⅞ lb., the newcomer delivers 1100 powerful impacts per minute, and has a free speed of 6000 rpm. An air-balanced, rubber-faced throttle valve provides a power assist for smooth-trigger pull and easy control. (Ingersoll-Rand Co.)

For more data circle No. 80 on postcard, p. 165

Chemical Milling Mask

Metalworkers engaged in the chemical milling of stainless steel, especially in aircraft and missile applications, now have available to them a new masking solution for the protection of non-milled surfaces. It will resist attack for 8 hr at 140°F. and it may be either dipped or sprayed to form a tough, pliable, rubber-like film thickness of 10 to 12 mils. After chemical etching of the desired metal area is completed, the area which had been protected from etching by the mask-

Choice of the wise buyer who compares...

CM HOISTS

CM METEOR ELECTRIC WIRE ROPE HOIST ½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control. Hook suspension; plain, geared or motor driven trolley.

CM LODESTAR ELECTRIC CHAIN HOIST—⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake, plus exclusive regenerative electrical braking. Upper-lower safety limit switches. CM-Alloy load chain. Single and three phase.

HAND OR ELECTRIC CHAIN OR WIRE ROPE
CM makes them all! So you can choose a hoist that's perfectly suited to your specific needs in a compact, rugged and safe CM design.
CM TROLLEYS AND CRANES

CM CYCLONE Hand Chain Hoist—¼ to 10 ton capacities—Easy to carry. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER—"The One Man Gang"—¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds and fits in a tool box. CM-Alloy load chain.

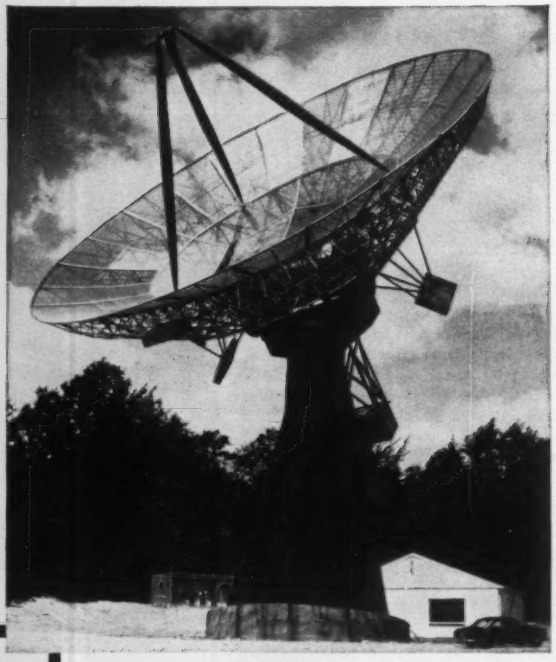
● **FOR OVER 75 YEARS,** Chisholm-Moore has offered hoist buyers the newest and most efficient designs, the most rugged construction, and the greatest number of valuable operating and safety features. CM hoists operate with a very minimum of maintenance. They give years of satisfying service.

Request catalog and name of local stocking distributor.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

One rpm per day



CONE-DRIVE GEARS

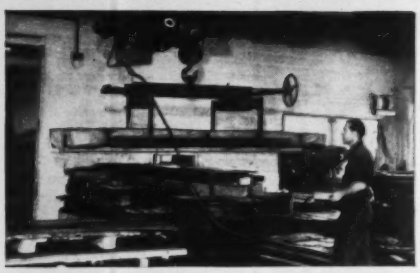
DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

It takes real accuracy in gearing to turn an 84-ft. radio telescope at that speed. Backlash on the Cone-Drive **double-enveloping worm** gear set used in the complex drive system was held to 0.0012-inch.

Dependable Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

MANSAVER® GRABS

Handle Millions of Tons in Your Industry



INCREASE YOUR PROFIT WITHOUT EXPANDING YOUR WAREHOUSE . . . USE MANSAVER GRABS!

One Eastern manufacturing plant, before installing an electric bridge crane and a Mansaver Grab, never thought of stocking over 300 tons of steel at a time. Now they carry up to 800 tons in the same space, handling man-hours were cut in half, service improved and profits appreciably increased.

If you are using sheets, coils, palletized or skid-loads, bars, billets, rods, tubes, boxes or barrels or other materials, send us your problem—we have probably answered it before. Or, ask our District Representative into your plant to study your problem for presentation for our solution.

CHECK ITEMS YOU HANDLE AND SEND FOR LITERATURE AND MORE INFORMATION

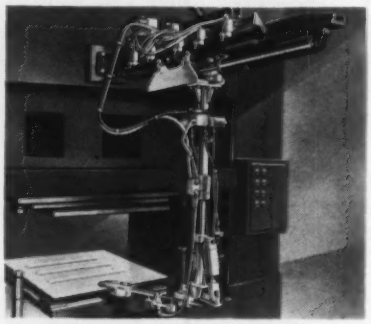
MANSAVER INDUSTRIES, INC.
3106 East St., New Haven, Conn.
Also Manufactured in England and in France

ing solution, can be easily and quickly stripped clean of the protective coating simply by peeling it off in large strips or sheets. (Rinshed-Mason Co.)

For more data circle No. 81 on postcard, p. 165

Mounted Extractor

A new extractor mounts on the back of a press with heavy-duty, hinge-type mounting brackets. With the locking pin removed, the unit swings aside, allowing access to the die. Completely self contained, it

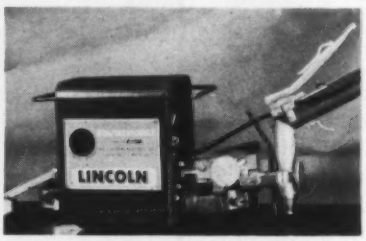


requires only one electrical connection with the press to instigate the grab and extraction cycle. A wide variety of grab jaws are offered. (Die & Automation, Inc.)

For more data circle No. 82 on postcard, p. 165

Trackless Carriage

Designed to produce long welds continuously, a 37 lb, compact tractor requires no supporting fixtures. The equipment can be easily moved to the job site and quickly placed in operation. This



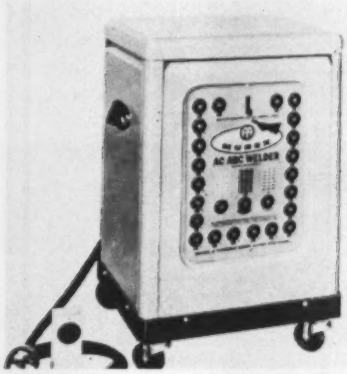
eliminates time loss and cost of moving bulky assemblies to fixtured, welding equipment. The carriage travels on a pair of magnetized rollers. These rollers prevent slipping and bouncing and yet move the trackless unit at speeds ranging

from 7 to 70 ipm. (The Lincoln Electric Co.)

For more data circle No. 83 on postcard, p. 165

Arc Welder

A new arcwelding machine for production, maintenance, and general shop welding has been designed for maximum operating convenience. The machine features simplified adjustments and built-in control of arc characteristics. Built to

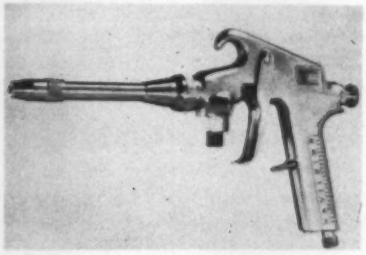


NEMA standard ratings, the machine has 66 heat settings over the current range from 7 to 300 amp. Automatic voltage control gives deep penetration at high-current outputs, and a soft arc for light gage welding. (Metal & Thermit Corp.)

For more data circle No. 84 on postcard, p. 165

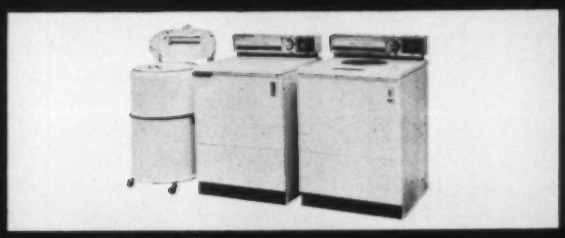
Cleaning Gun

A high-velocity spray, pressure-type cleaning gun for use in factories, foundries and maintenance shops — wherever fast, thorough cleaning and degreasing is necessary—delivers a driving spray to

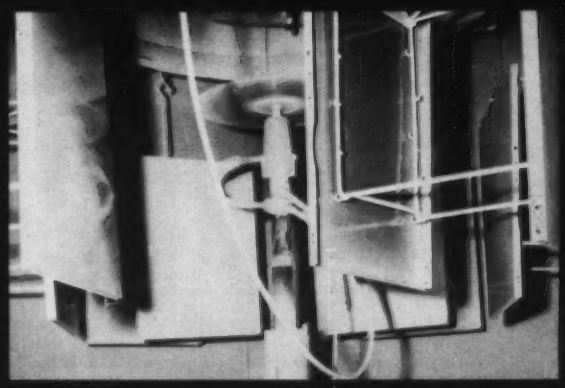


knock off dirt and provide coarse, hard-hitting drops to penetrate built-up films. It is also adjustable for a full range down to a gentle mist. An extension nozzle permits spraying into cavities and other hard-to-reach areas. An adjustment on the gun

KELVINATOR
Washers and Dryers



Get their High Quality Finish with



RANSBURG NO. 2 PROCESS

Kelvinator Division of American Motors switched from hand spray to RANSBURG No. 2 PROCESS Electro-Spray to meet increased production schedules . . . improve the quality of the finish . . . and lower finishing costs.

SAVINGS EXCEEDED EXPECTATIONS

Demonstration tests in the Ransburg labs indicated substantial savings in finishing costs, but in actual production, SAVINGS ARE EVEN GREATER than estimated. That's why Kelvinator is now considering RANSBURG Electrostatic Spray Painting for other products of their "white goods" line: Refrigerators . . . Home Freezers . . . Ice Cream Cabinets . . . Electric Ranges, as well as some components.

NO REASON WHY YOU CAN'T DO IT, TOO!

Want to know how Ransburg No. 2 Process can improve the quality of YOUR painted products, and at the same time, cut YOUR paint and labor costs? Write for our No. 2 Process brochure. Or, if your production doesn't justify automatic painting, let us tell you about the new No. 2 Process Electrostatic Hand Gun which can be used in either conveyorized, or non-conveyorized painting.

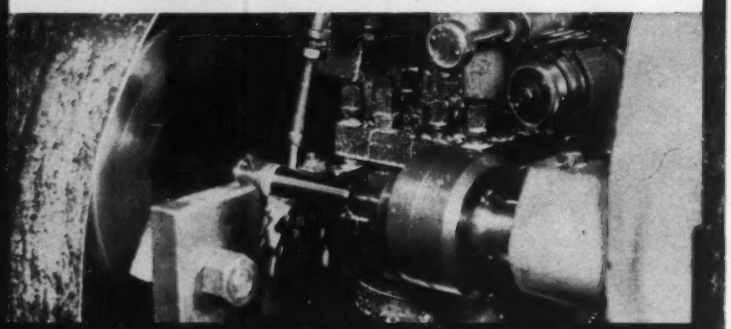
RANSBURG

RANSBURG
Electro-Coating Corp.
Box-23122, Indianapolis 23, Indiana

machine all these small parts from

Bearings
Blanks
Bushings
Cams
Clutch Plates
Collets
Cylinders
Dies
Discs
Gauges
Gears
Jigs
Liners
Pinions
Pistons
Plug Laps
Pulleys
Pump Parts
Quills
Rings
Rolls-Rollers
Seals
Sheaves
Sleeves
Spindles
Sprockets
Trunnions
Valve Guides
Valve Parts
Washers

6′ SHENANGO IRON BARS



Now, many parts formerly cast to shape can be machined at lower cost from Shenango solid bars and centrifugally cast tubular bars.

Bars and tubes are available centerless ground for automatic screw machines or as cast for turret or engine lathe work. Expensive patterns are eliminated. Uniformity is guaranteed. Inventory is reduced. Production output is increased.

Write on your letterhead for a machining sample of Meehanite Metal, Ni-Resist or Ductile Iron. Centrifugally Cast Products Division, The Shenango Furnace Company, Dover, Ohio.

SHENANGO CENTRIFUGAL CASTINGS

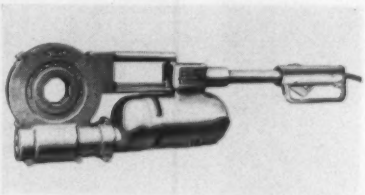
COPPER, TIN, LEAD, ZINC BRONZES • MANGANESE AND ALUMINUM BRONZES
MONEL METAL • NI-RESIST • MEEHANITE® METAL • ALLOY IRONS • DUCTILE IRON

permits a quick change of the amount of material being sprayed. The gun can be used with all common cleaning and degreasing materials. (The DeVilbiss Co.)

For more data circle No. 85 on postcard, p. 165

Pipe Threader

Weighing only 20 lb, a portable pipe threader threads ¼- to 4-in. pipe on the job or in the shop. With direct drive, ¼- to 1-in. pipe is threaded in 20 seconds. It takes about a minute to thread 1- to 2-in.



pipe. Use of a speed reducer cuts time requirements even further. Larger pipes are threaded with an adapter which fits geared-die stocks. (Albertson & Co., Inc.)

For more data circle No. 86 on postcard, p. 165

Jet Blaster

A jet blaster can blast clean core boxes or pattern plates, either hot or cold. Therefore, a core box can be cleaned while it is mounted on a shell machine without cutting the temperature. The unit is equipped with 6 ft of abrasive supply hose, ¼-in. nozzles and ⅛-in. air jets which are heat treated for greater durability. A minimum air pressure of 90 psi through a 5/16-in. air hose is recommended. (The National Acme Co.)

For more data circle No. 87 on postcard, p. 165

Machinery Mount

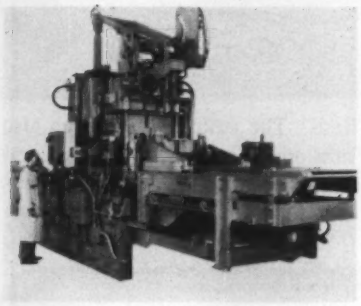
A new machinery mount maintains level within 0.0005 in. per ft of length, regardless of load, with a repeatable accuracy better than 0.1 pct. Each mount is basically a pneumatic servomechanism. It is installed simply by sliding it under the support points of the equipment. Leveling is easily and quickly accomplished. Operating from a standard factory air supply, the

mount automatically compensates for changes in loading, variations in floor level due to changes in foundation rigidity, external and internal thermal changes. At the same time that it makes this automatic compensation, the mount effectively isolates vibration and shock, since the mounted equipment is supported on a cushion of air. (Barry Controls)

For more data circle No. 88 on postcard, p. 165

Butt Welder

In a continuous tube mill, flat skelp to maximum size of 0.337 by 20-in. wide is joined—one coil to the next—for high production. Strip is flash-butt welded and the flash trimmed off in a rapid, automatic cycle. The final joint has a smooth surface and weld characteristics are

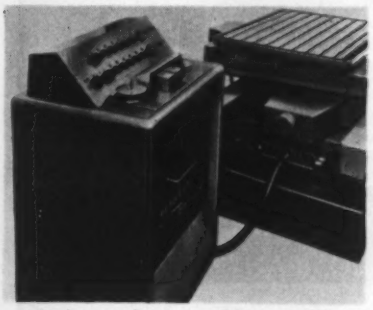


equivalent to the parent metal of the skelp. Before clamping the strip for welding, the ends are run against a gage or space bar, which is inserted between the welding dies to insure that the proper amount of strip projects from the dies for welding. (The Taylor Winfield Corp.)

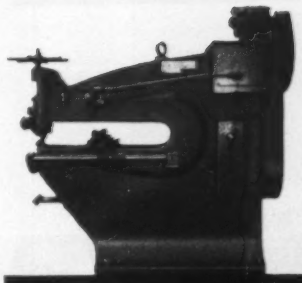
For more data circle No. 89 on postcard, p. 165

Numerical Controls

Numerical-control systems, made by Ferranti, Ltd., can be applied to a variety of contouring, positioning

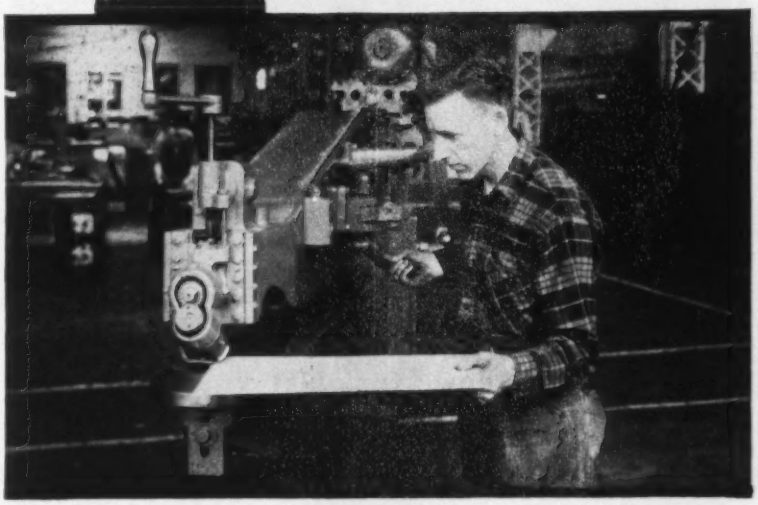


and inspection machines. These numerical-control systems include a punched-tape positioning system, a



BEATTY-QUICKWORK

Rotary Shear Does the Work of 7 Machines



CUTS ANY DESIRED SHAPE AT SPEEDS TO 150 F. P. M.

The BEATTY-QUICKWORK Rotary Shear **alone** does the work of such machines as:

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- Punch Shears
- Gap Shears
- Bevel Shears
- Rotary Splitting Shears
- Alligator Shears
- Flame Cutting Equipment

This Rotary Shear is a real cost-saver for almost any type of metal working shop — produces superior work fast, accurately, efficiently and actually eliminates the need for several other types of equipment.

Cut straight lines, openings, odd shapes, narrow strips, bevels and circles — also flanges or joggles . . . do them all faster, easier, more accurately with a Beatty-Quickwork Rotary Shear. It's the proven way to cut costs of metal fabrication.

This versatile shear cuts plate and sheet metal up to 1-inch mild steel. Unique inclined arrangement of cutter shafts and cutters facilitates shearing irregular shapes and straight lines with extreme accuracy. Only one operator is needed to perform most jobs. Thus, the rotary shear actually pays for itself in savings in equipment and floor space investment, manpower, increased output. Complete range of sizes.

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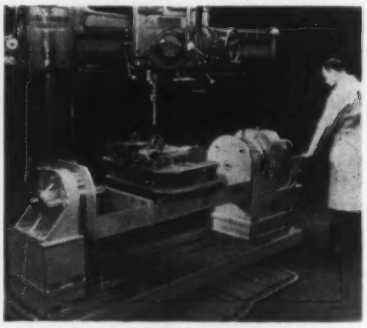
NEW EQUIPMENT

magnetic-tape contouring system and a coordinate-inspection machine. (Bendix Aviation Corp.)

For more data circle No. 90 on postcard, p. 165

Indexing Positioner

A powdered indexing-positioner speeds drilling and boring of accurately located holes on a production



basis. The motorized trunnion also suits other operations, such as reaming, tapping and counter boring. Each unit can be built to exact cus-

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tomer specifications by using a building block principle. (Johnson & Bassett, Inc.)

For more data write No. 91 on postcard, p. 165

Static-Trip Device

A new static-overcurrent-trip device with no moving parts provides greater accuracy, reliability and more desirable tripping characteristics than existing oil or air-time-delay devices. Self-contained, the new device requires no external source for tripping. Timing and tripping are performed by the static-trip units energized from tripping transformers mounted on the circuit breaker. The newcomer has an 80 to 200-pct variable pickup and an instantaneous pickup which is adjustable from 4 to 30 times the minimum pick-up setting of the breaker. (Allis-Chalmers Mfg. Co.)

For more data write No. 92 on postcard, p. 165

Steel-Pickling Aid

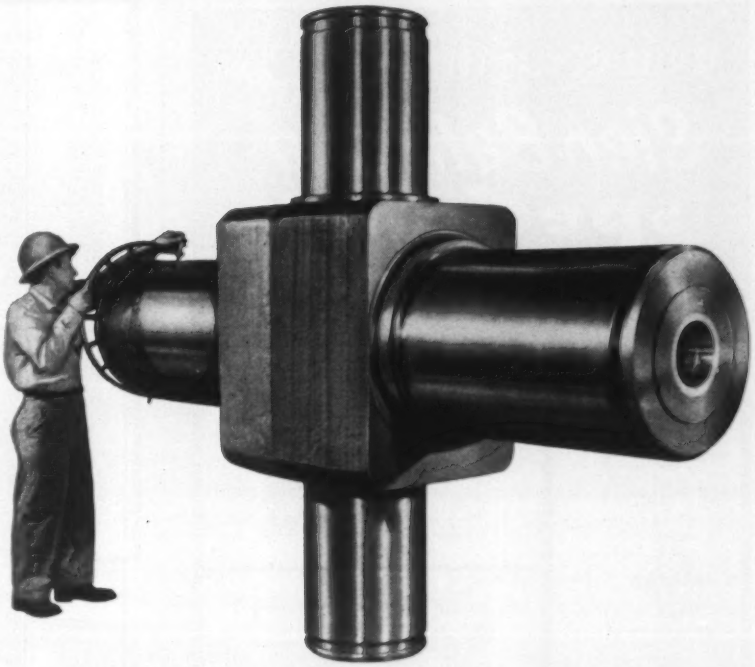
In actual plant trials with solutions of 5-pct sulphuric acid and 5-pct Acid-Aid N-F, operating at 160°F, the gravity of pickling solutions is increased to 1.49 sp gr. Effectively this doubles the ferrous-sulfate content of the pickling solution. This in turn reduces the volume of waste-pickle liquor that must be discarded to about half of that previously produced. (Milport Chemical Co.)

For more data write No. 93 on postcard, p. 165

Hydroform Metals

Improvement in hydrostatic-powder-compacting techniques through the use of film bags solves several problems encountered in hydroforming of metals, plastics, clays, and ceramics. Dies and molds for shaping powder before compacting can now be made from inexpensive materials. Parts may be fabricated without soft centers. The new method also enables compacting of large pieces, such as 10-in. diam and 4-ft long consumable tungsten electrodes. (Visking Co., div. of Union Carbide Corp.)

For more data write No. 94 on postcard, p. 165



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This 27,000 pound steel forging,* made to support a million pound load, was completely manufactured from molten steel to a finished machined part in the Finkl shops.

A 115,000 pound electric furnace steel ingot was cast, forged, hot cut and heat treated, followed by hundreds of hours of rough and finished machining. Then the square section was heated to accept the horizontal part to complete the shrinking operation to make this equalizing axle.

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*Replaced a casting

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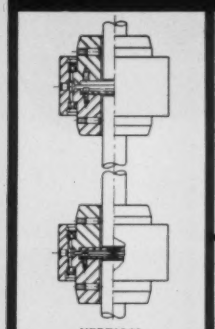
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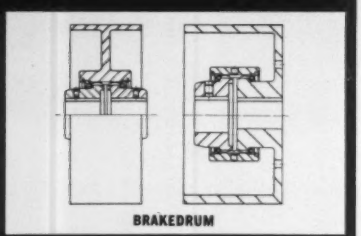
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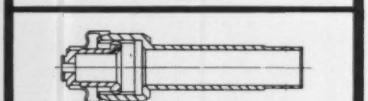
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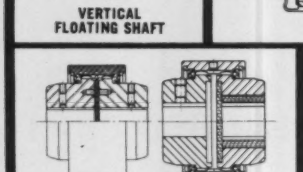
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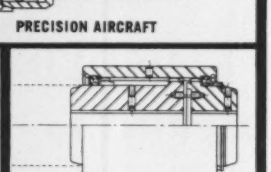
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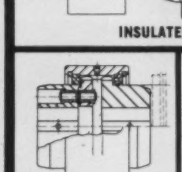
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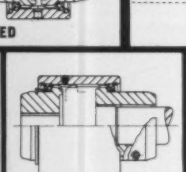
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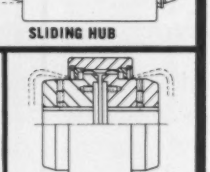
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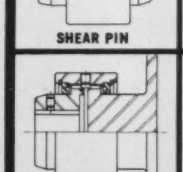
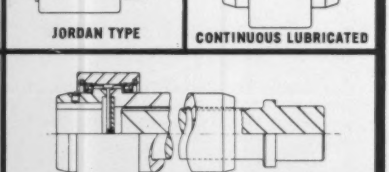

FLANGED HUB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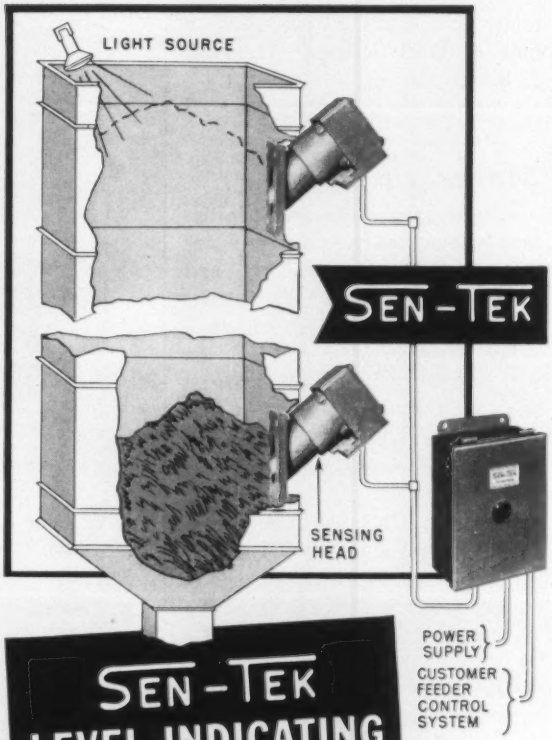

SEN-TEK LEVEL-INDICATING SYSTEM *Light-Sensing Type*

EUCLID Bulletin E-200

Sen-Tek Control, the electronic light-sensing device, detects and controls the level of opaque and solid materials. It detects levels of such materials as foundry sand, powdered coal, carbon, sugar, flour, salt and grain—or heavy, bulky materials such as stones, slag, coal, coke and ore.

It installs easily on bins, tanks, hoppers, grain elevators, etc., as top-level and bottom-level indicators. Or it may be used as either a top or bottom-level indicator.

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WHAT'S YOUR PROBLEM?

Ask for Bulletin E-200

EX-19

The EUCLID Electric & Mfg. Co.

MADISON • OHIO

The Iron Age Summary

Steel Orders Approach Bottom

Orders may hit the bottom of the downtrend in May, but production decline will continue.

Comparative strength of the sheet market tends to obscure condition of the market for depressed products.

■ New steel orders may be approaching the low point, but a pickup will not reverse the week-to-week downtrend in production.

This apparent contradiction is the result of the current new order rates as low as 42 to 48 pct of capacity of individual mills, while production is still well over that figure. Even if orders do pick up, production will have to continue its decline to the rate of new business.

Sheets Stay Strong—The seriousness of the overall steel outlook is covered up by strength of the sheet market. And recently the automakers came back for more June cold-rolled sheet tonnage. With some other new orders for June, flat-rolled is holding up well.

But at the same time, automakers are eying the close-out time for 1960 models. Some will start in July; the rest will close out at intervals into September.

Automotive Effects — It is significant that the longer auto production will be in the compacts, which use an average of 800 pounds less steel than the medium-sized cars.

It is also significant that the new automotive orders were placed without lengthening the delivery time on the new orders. But except for an occasional rush, there is no pressure for delivery in less than four to six weeks from the automakers.

Inventory Factor—There is little hope for any early buildup in inventories. Some companies which had cut to the minimum number of days of inventory now are cutting further as their own rates of production lag. And steelmakers anxious for orders are doing little to discourage rock-bottom inventory policies. They will make prompt delivery for most products and are competing for sales on a delivery basis.

A few mills, however, are cautioning against letting inventories get too low on products that have a long lead time. They warn that any upturn in business could result in shortages of these products.

Points to Watch—Here are some points that reflect market conditions:

In reporting market information, the closer the source is to the customer, the more likely he is to be pessimistic. Executives take the long-term view while salesmen in direct contact with the customers are extremely pessimistic about the outlook for new business.

Products which had been considered the strongest have shown sudden signs of weakening. Galvanized has weakened in the Midwest while tinplate inventories are piling up at the mill as releases are coming in slower than expected.

There is little indication of a pickup in already-depressed products, while the indications are that sheets will inevitably fall off.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,102	2,137	2,225	2,631
Ingot Index				
(1947-1949=100)	130.9	133.0	138.5	163.8
Operating Rates				
North East Coast	76.0	81.0	79.0	92.0
Buffalo	78.0	78.0	88.0	99.0
Pittsburgh	75.0	76.0	79.0	95.0
Youngstown	50.0	52.0	64.0	86.0
Cleveland	77.0	74.0	90.0	97.0
Detroit	95.0	97.0	52.0	96.0
Chicago	75.0	76.0	86.0	92.0
Cincinnati	84.0	84.0	100.0	85.0
St. Louis	85.0	88.0	85.0	109.0
South	77.0	77.0	76.0	91.0
West	69.0	73.0	72.0	94.0
U. S. Rate	73.8	75.0	78.1	92.9

*Revised
Source: American Iron And Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$33.17	$33.17	$33.50	$33.83
No. 2 bundles	$23.17	$23.17	$23.00	$22.83
Nonferrous				
Aluminun ingot	28.10	28.10	28.10	26.80
Copper, electrolytic	33.00	33.00	33.00	31.50
Lead, St. Louis	11.80	11.80	11.80	11.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	99.00	99.25	99.375	102.75
Zinc, E. St. Louis	13.00	13.00	13.00	11.00

Electrical Equipment Sales Up

For the most part, electrical equipment makers are having a better year than they did in 1959.

Government and industrial orders are bolstering a slow consumer market.

▪ Electrical equipment manufacturers in early 1960 are enjoying generally greater sales than last year. Improvements are running as high as 10 pct. Customer orders and order backlogs, in many cases, are also above a year ago.

Where consumer interest isn't up to par, better industrial and government business appears to be taking up the slack. Missiles and radar equipment are becoming increasingly more attractive markets to suppliers of electrical parts and components.

Bright Spot—Nevertheless, one of the brightest areas is electrical machinery. Government surveys indicate this market will rise more than 40 pct above last year.

Surveys in the Detroit area trace a healthy market for electrical controls for machine tools. A designer and fabricator of electrical control panels claims machine tool customers are his best ones today. He rates the welding market fair and industrial furnaces and ovens poor. He says most furnace business is patch-up work, not new orders.

More Orders—Philco Corp., for one, reports rising government and industrial orders bolstered a softer consumer goods market in the first quarter. At Westinghouse Electric Corp., new defense orders in the first three months of 1959 doubled over a year earlier. Apparatus orders were up one-third. Sales were paced by atomic equipment.

At General Electric Co., sales of heavy electrical generating equipment, transmission equipment, jet engines and locomotives in January-March fell to the extent that company sales were 2 pct off last year's pace. This was attributed to low orders in 1957-58 by customers with long manufacturing cycles. Such orders are picking up now. But shipments won't be affected until late this year.

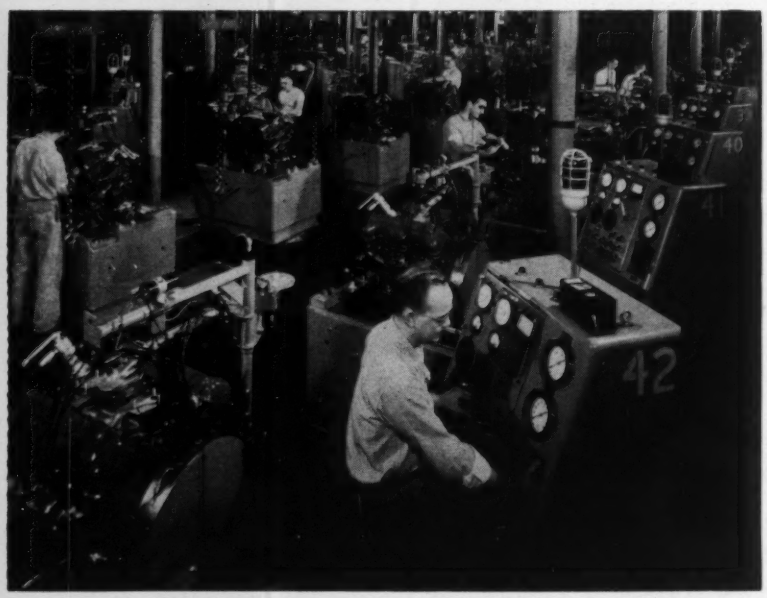
Demand for computing equipment apparently is not dwindling. There are currently more unfilled orders for data processing machines at International Business Machines Corp. now than a year ago.

Varied Views — Mixed feelings pervade the electrical appliance field. The industry as a whole is toning down earlier estimates that sales in 1960 would top 1959 by 15 to 20 pct. Now talk is centering on a 5 pct improvement.

Sales reportedly didn't shape up to expectations in the first quarter. Production ran high for such goods as refrigerators, toasters and washing machines. But sales didn't match output, and inventories mounted.

Some Good—But all isn't bleak. Sales of room air conditioners, television sets, hi-fi sets and home radios are strong. Zenith Radio Corp. factory shipments of television sets hit the best first-quarter level in company history, and were 20 to 25 pct above last year.

In January, GE slashed the price of silicon controlled rectifiers by 20 to 40 pct. These are made of the same material as transistors. They convert current from one type to another, and find use in such areas as drive controls for steel and paper mills, missile power supplies and missile launching systems.



PERFORMANCE CHECK: Control panels record engine performance of Chevrolet engines before they leave the production line.

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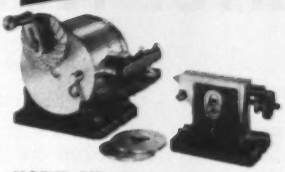

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Shipments Set New 1st Quarter Record

Shipments of finished steel in the first quarter set a new record for the period.

And direct mill shipments for automotive uses set a new record for any period.

■ Shipments of finished steel products set a new first-quarter record. The total for the first three months of this year was 23.97 million net tons, American Iron and Steel Institute reports. This compares with shipments of 20.8 million tons in the same period in 1959.

The previous high for a first quarter was 23.3 million tons shipped in the first quarter of 1956. However, the record for any quarter is 27.3 million tons, set in the April-June period last year.

Record for Autos—Direct mill shipments of steel for automotive purposes set a new record for any quarter. The total of 5.3 million tons compares with the previous high of 5.2 million tons shipped during the second quarter of 1959.

Shipments of 4.65 million tons of cold-rolled sheets during the first three months of 1960 also set a new record. They topped the former high set in the second quarter of last year by 26,000 tons.

March Tops February — Shipments of steel in March amounted to 7.97 million tons. This was slightly less than the 8.1 million tons shipped in the same month of 1959. However, shipments were up from February of this year when the total was nearly 7.6 million tons.

Warehouses and distributors took 4.4 million tons of steel, or 18.8 pct, during the first quarter this year. A year ago, this group took 3.74 million tons, or 18.4 pct of the total. However, shipments to warehouses are not adjusted to final users.

Other Users — Construction, including maintenance, accounted for 2.84 million tons, 12.1 pct, during the period. In the 1959 period the total was 2.49 million tons, 12.2 pct.

Containers received 1.98 million tons in the first quarter, up from 1.89 million tons a year ago. However, this group took a smaller share of the total, down to 8.4 pct from 9.3 pct.

An increase in tonnage but a decrease in the share of total shipments was also recorded for the machinery, industrial equipment and tools group. Steel shipments to this group totaled 1.44 million tons, 6.1 pct, compared with 1.28 million tons, 6.3 pct, in the first quarter of 1959.

Bars — Cold-finished bars are holding up much better than hot-rolled. A cold-finish bar mill in the Chicago district expects its second quarter operations to hold at about 80 pct of the first quarter. The outlook is less optimistic for hot-rolled bars. A mill in the same district says it lost an order because another mill was able to deliver the material in 10 days. Producers in **Pittsburgh** say hot-rolled backlogs are gone and customers are holding orders to a minimum. One mill looks for operations to run between 50 and 55 pct of capacity this month. And June will bring little change.

Plate and Structurals—Plate mills on the **East Coast** still have plenty of room on May books, and June books are wide open. Both plate and structurals are freely available in the **Midwest,** but a pickup in buying at mill and warehouse levels has been noticed in **Chicago.** Tank fabricators and pipeline activity account for activity in light and heavy plate. But structural fabricators, who use both plates and structurals, are stepping up their orders. However, consumption exceeds new orders as users reduce inventories accumulated in the first quarter.

Pipe and Tubing—Pipe mills are bringing operations into line with orders—and the order rate is under 50 pct—according to **Pittsburgh** reports. One continuous weld mill plans a one-week shutdown. Oil country seamless faces both an inventory liquidation and a period of reduced consumption. Drilling is running below last year, and well below expectations for this year.

Tinplate—This market is experiencing a seasonal lag. And one producer in **Pittsburgh** says "it's up to its ears in inventory." However, the mill expects shipping releases to come through soon enough to avert a jam, otherwise storage space will be at a premium.

Wire — The spring agricultural market has been lost entirely, according to wiremakers around **Chicago.** And a pickup in demand isn't expected before fall. There has been a small spurt in rush orders for manufacturer's wire, but this isn't expected to reverse the downtrend of the market. However, wiremakers look for improvement in August, and a few are already scheduling July and August operations in line with this.

PURCHASING AGENT'S CHECKLIST

Users ask machine tool builders to standardize. P. 103

Hard sell is back for steelmakers. But they are uncertain how long it will last. P. 108

Value engineering can cut costs as much as 30 to 50 pct. P. 148

COMPARISON OF PRICES

(Effective May 10, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	May 10 1960	May 3 1960	Apr. 12 1960	May 12 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	May 10 1960	May 3 1960	Apr. 12 1960	May 12 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.57
Foundry, Southern Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$34.50	$34.50	$34.50	$36.50
No. 1 steel, Phila. area	34.50	34.50	34.50	33.50
No. 1 steel, Chicago	30.50	30.50	31.50	31.50
No. 1 bundles, Detroit	29.50*	30.50	30.50	31.50
Low phos., Youngstown	36.50	36.50	36.50	38.50
No. 1 mch'y cast, Pittsburgh	50.50	50.50	51.50	49.50
No. 1 mach'y cast, Phila.	51.50	51.50	51.50	49.50
No. 1 mach'y cast, Chicago	51.50	51.50	52.50	53.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$33.17	$33.17	$33.50	$33.83
No. 2 bundles	23.17	23.17	23.00	22.83
Coke Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	$14.75-15.50	$14.75-15.50	$14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	31.50
Copper, Lake, Conn.	33.00	33.00	33.00	31.50
Tin, Straits, N. Y.	99.00*	99.25	99.375	102.75
Zinc, East St. Louis	13.00	13.00	13.00	11.00
Lead, St. Louis	11.80	11.80	11.80	11.80
Aluminum, virgin ingot	28.10	28.10	28.10	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composites

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Can Dealers Wait Out Mill Buyers?

With mill buyers on the sidelines, dealers are getting resigned to a quiet market.

Some are limiting their own purchasing. Others are building yard stocks against better sales.

■ Dealers seem to be settling down to wait out the mills.

With mills still not buying, dealers are reluctantly adjusting to the market. In some cases they are in no hurry to build up yard stocks.

The thinking seems to run like this: There are no sure estimates when business will improve. Therefore, inventories may be filled later at even lower prices.

On the other hand, some yards are reported building stocks. In this case they hope to sell on a stronger market later.

Fewer Supplies—Generally, the amount of scrap seems to be drying up. Low prices are not encouraging collections. Industrial scrap supplies are less plentiful. Export sales are keeping coastal markets pretty well cleaned out.

In those markets where scrap is moving on domestic orders, prices are easing off. Brokers can cover orders at existing prices because tonnages involved are usually small. Even where scrap is not moving, inactivity is sometimes pushing prices down slightly.

Pittsburgh—This market shows a lack of demand at both the mill and yard levels. Prices have dropped to the point where shipments are moving slowly on old orders. However, there is no mill pressure to translate this tightness into price strength. Dealers show no inclination to build yard stocks against future demand. No one is sure when business will revive. Some dealers feel it will be possible to refill inventories at still lower prices. On the basis of early railroad lists, the price of No. 1 RR heavy melting is off another $1.

Chicago—Scrap continues in low supply in a dull market. But there are reports of scrap inventory building by dealers expecting a stronger market later on. Industrial scrap output appears to be shrinking. But here, also, some generating plants are laying down stocks in expectation of stronger prices. Factory bundle prices increased their spread to $35 to $37.

Philadelphia—The bulk of steelmaking grades is still moving to the docks for export. Domestically, the market is very quiet. Only one mill in the area has done any recent buying. Export demand has kept the district fairly well cleaned out of scrap. Cast grades are holding their own. Some turnings grades are down, strictly on a nominal basis. There's little optimism among sellers. Dealers and brokers who thought the market had hit bottom, now are not so sure.

New York—Export sales are still holding up well enough to maintain current prices. Dealers say that generally they have the export orders, and the metal to fill them, for May and June.

Detroit—Although mills are still reluctant to buy, there's been no panic selling by dealers. However, countinued inactivity this week brought softer prices for some items. However, optimists were encouraged by export activity in early May.

Cleveland—Prime grades are off $1 on generally dwindling demand and lower railroad lists. With more furnaces in the area being shut down, there's no sales revival in sight. Foundries are also slow and buying scrap only when they get an order.

St. Louis—Prices eased off again in a quiet market. Steelmaking grades declined slightly. Deeper drops came for railroad grades, down $1, and some turnings grades, down $2. Mills are still buying sparingly.

Cincinnati—Buying programs in this area are at the low point for the year. Brokers can cover orders at present depressed prices because the tonnages are small.

Birmingham—Very little scrap is moving to consumers and even less is coming into dealers' yards. Prices are unchanged, with brokers quoting nominal prices on most grades. Dealers say they can fill the small orders coming in without difficulty.

Buffalo—A flurry of buying kept traders busy this week. Some grades —including No. 1 heavy melting, No. 2 bundles, mixed borings and turnings, and short shoveling turnings—all went at existing prices. No. 2 heavy melting was down $2 from previous prices. Cupola cast sold $1 lower. Machinery cast prices were unchanged.

Boston — The market continues drab with little activity. No. 1 heavy melting, No. 1 dealer bundles, and No. 1 busheling are all down $1.

West Coast—The domestic market remains lifeless. Exporting to Japan is practically the only activity. A large shipment of No. 1 cupola cast raised the price at Los Angeles to $42 to $43.

Houston—Prices are unchanged in a quiet market. Exporters are active, but the cargoes are limited. Two ships have been loaded for Mexico. One cargo for Japan is expected.

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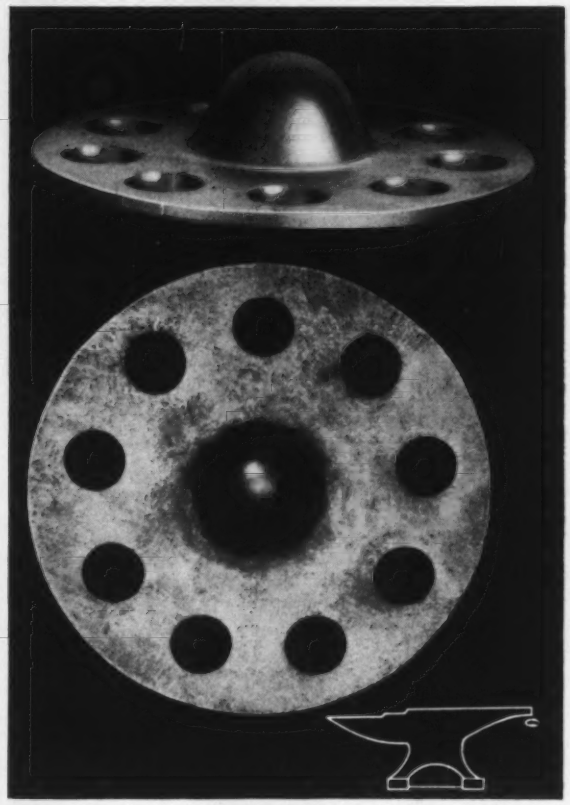

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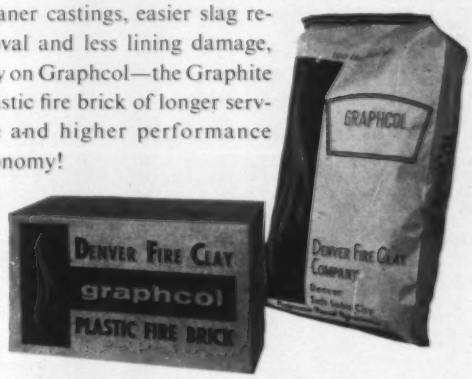

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SCRAP PRICES *(Effective May 10, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	39.00 to 40.00
No. 2 bundles	27.00 to 28.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	20.00 to 21.00
Low phos. punch'gs plate	41.00 to 42.00
Heavy turnings	30.00 to 31.00
No. 1 RR hvy. melting	37.00 to 38.00
Scrap rails, random lgth.	52.00 to 53.00
Rails 2 ft and under	58.00 to 59.00
RR specialties	46.00 to 47.00
No. 1 machinery cast.	50.00 to 51.00
Cupola cast.	44.00 to 45.00
Heavy breakable cast.	42.00 to 43.00
Stainless	
18-8 bundles and solids	210.00 to 215.00
18-8 turnings	110.00 to 115.00
430 bundles and solids	105.00 to 110.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	35.00 to 37.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	43.00 to 44.00
Low. phos. punch'gs plate, ¼ in. and heavier	37.00 to 38.00
Low phos. 2 ft and under	35.00 to 36.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	45.00 to 46.00
Rerolling rails	53.00 to 54.00
Rails 2 ft and under	52.00 to 53.00
Angles and splice bars	44.00 to 45.00
RR steel car axles	50.00 to 51.00
RR couplers and knuckles	41.00 to 42.00
No. 1 machinery cast.	51.00 to 52.00
Cupola cast.	45.00 to 46.00
Cast iron wheels	37.00 to 38.00
Malleable	49.00 to 50.00
Stove plate	41.00 to 42.00
Steel car wheels	41.00 to 42.00
Stainless	
18-8 bundles and solids	205.00 to 210.00
18-8 turnings	105.00 to 110.00
430 bundles and solids	105.00 to 110.00
430 turnings	50.00 to 55.00

Philadelphia Area

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	14.00 to 15.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	20.00 to 21.00
Clean cast. chem. borings	25.00 to 26.00
Low phos. 5 ft and under	37.00 to 38.00
Low phos. 2 ft punch'gs	39.00 to 40.00
Elec. furnace bundles	37.00 to 38.00
Heavy turnings	28.00 to 29.00
RR specialties	43.00 to 44.00
Rails, 18 in. and under	58.00 to 60.00
Cupola cast.	40.00 to 41.00
Heavy breakable cast.	42.00 to 43.00
Cast iron car wheels	44.00 to 45.00
Malleable	55.00 to 56.00
No. 1 machinery cast.	51.00 to 52.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.50 to $30.50
No. 2 hvy. melting	24.50 to 25.50
No. 1 dealer bundles	29.50 to 30.50
No. 2 bundles	19.50 to 20.50
Machine shop turn.	12.00 to 13.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	14.00 to 15.00
Low phos. 18 in. and under	37.00 to 38.00
Rails, random length	48.00 to 49.00
Rails, 18 in. and under	55.00 to 56.00
No. 1 cupola cast.	41.00 to 42.00
Hvy. breakable cast.	36.00 to 37.00
Drop broken cast.	49.00 to 50.00

Youngstown

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	21.00 to 22.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	19.00 to 20.00
Low phos. plate	36.00 to 37.00

Cleveland

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut structural & plates, 2 ft & under	37.00 to 38.00
Drop forge flashings	31.00 to 32.00
Low phos, punch'gs plate	32.00 to 33.00
Foundry steel, 2 ft & under	34.00 to 35.00
No. 1 RR hvy. melting	34.50 to 35.50
Rails 2 ft and under	57.00 to 58.00
Rails 18 in. and under	61.00 to 62.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	55.00 to 56.00
No. 1 machinery cast.	52.00 to 53.00
Stove plate	43.00 to 44.00
Malleable	49.00 to 50.00
Stainless	
18-8 bundles	200.00 to 205.00
18-8 turnings	90.00 to 95.00
430 bundles	95.00 to 100.00

Buffalo

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 busheling	30.00 to 31.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	16.00 to 17.00
Low phos. plate	40.00 to 41.00
Structurals and plate, 2 ft and under	40.00 to 41.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	46.00 to 47.00
No. 1 cupola cast.	42.00 to 43.00

St. Louis

No. 1 hvy. melting	$30.50 to $31.50
No. 2 hvy. melting	29.00 to 30.00
Foundry steel, 2 ft	31.50 to 32.50
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	11.00 to 12.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	17.00 to 18.00
No. 1 RR hvy. melting	34.00 to 35.00
Rails, random lengths	42.00 to 43.00
Rails, 18 in. and under	46.00 to 47.00
RR specialties	41.00 to 42.00
Cupola cast.	45.00 to 46.00
Heavy breakable cast.	34.00 to 35.00
Stove plate	39.00 to 40.00
Cast iron car wheels	35.00 to 36.00
Rerolling rails	52.00 to 53.00
Unstripped motor blocks	36.00 to 37.00

Birmingham

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	21.00 to 22.00
Shoveling turnings	22.00 to 23.00
Cast iron borings	12.00 to 13.00
Electric furnace bundles	35.00 to 36.00
Elec. furnace, 3 ft & under	33.00 to 34.00
Bar crops and plate	40.00 to 41.00
Structural and plate, 2 ft.	39.00 to 40.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	43.00 to 44.00
Rails, 18 in. and under	47.00 to 48.00
Angles and splice bars	42.00 to 43.00
No. 1 cupola cast.	50.00 to 51.00
Stove plate	49.00 to 50.00
Cast iron car wheels	42.00 to 43.00
Unstripped motor blocks	40.00 to 41.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	21.00 to 22.00
No. 2 dealer bundles	16.00 to 17.00
Machine shop turnings	7.00 to 8.00
Mixed bor. and turn.	9.00 to 10.00
Stoveling turnings	10.00 to 11.00
Clean cast. chem. borings	20.00 to 21.00
No. 1 machinery cast.	38.00 to 39.00
Mixed yard cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 prepared solids	195.00 to 200.00
18-8 turnings	85.00 to 90.00
430 prepared solids	80.00 to 85.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	16.00 to 17.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	27.00 to 28.00
Drop forge flashings	28.00 to 29.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Heavy breakable cast.	36.00 to 37.00
Mixed cupola cast.	38.00 to 39.00
Automotive cast.	45.00 to 46.00
Stainless	
18-8 bundles and solids	190.00 to 195.00
18-8 turnings	60.00 to 65.00
430 bundles and solids	70.00 to 75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	13.00 to 14.00
No. 1 busheling	26.00 to 27.00
Machine shop turn.	6.00 to 7.00
Shoveling turnings	9.00 to 10.00
Clean cast. chem. borings	13.00 to 14.00
No. 1 machinery cast.	39.00 to 40.00
Mixed cupola cast.	32.00 to 33.00
Heavy breakable cast.	30.00 to 31.00

San Francisco

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	30.00
No. 2 bundles	20.00
Machine shop turn.	$14.00 to 15.00
Cast iron borings	14.00 to 15.00
No. 1 cupola cast.	44.00

Los Angeles

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	27.00
No. 2 bundles	17.00
Machine shop turn.	15.00
Shoveling turnings	15.00
Cast iron borings	$15.00 to 16.00
Elec. furn. 1 ft. and under (foundry)	41.00
No. 1 cupola cast.	42.00 to 43.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	33.00
No. 2 bundles	22.00
No. 1 cupola cast.	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.25
No. 2 hvy. melting	28.25
No. 1 dealer bundles	32.25
No. 2 bundles	20.00
Mixed steel scrap	24.25
Bush., new fact., prep'd	32.25
Bush., new fact., unprep'd	26.25
Machine shop turn.	14.00
Short steel turn.	17.00
Mixed bor. and turn.	13.00
Cast scrap	$46.50 to 48.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	31.00
No. 2 bundles	19.00
Machine shop turn.	15.00
Shoveling turnings	17.00
Cut structural plate 2 ft & under	$41.00 to 42.00
Unstripped motor blocks	29.00 to 30.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	26.00 to 27.00

NO MATTER
THE SIZE
OF YOUR FURNACE
OR THE
MANNER OF
CHARGING—
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Foreign Buying Slack Keeps Copper Level

Built-up foreign inventories and buyers learning to live with African strike threat are cited as reasons for demand ease.

U. S. copper consumers have stopped dipping into inventories. June shipments may match consumption.

■ There's an easing right down the line in copper this week. But it's more of a leveling off process than an out-and-out dip.

June now becomes the month to watch. Just about all major sellers in the U. S. are sold out for May delivery. Producer's books are not yet open to June.

But custom smelters who are accepting orders say there are signs of easing of demand. Primary cause: Foreign buyers aren't in the big hurry for metal that they were in the last few weeks.

No one is quite sure why. Best guess is a combination of improved inventories over several weeks ago and European buyers now used to living with the threat of labor trouble hanging over the African copperbelt. Then too, feeling now is that the Anaconda labor trouble in Chile is not likely to spread. And many copper men in the U. S. say it won't last long.

A top spokesman for a custom smelter says that even if the boom that European buyers have created in U. S. markets fades, it is not likely to disappear. He feels European buyers will protect themselves in the future from the full effects of any eruptions of labor trouble in Africa by diversifying their normal sources of supply.

There are no signs yet that U. S. copper consumers are ready to start rebuilding their inventories. But, says one copper seller, there are signs that they have at least stopped dipping into inventories. Where shipments of copper in April and May are somewhat under consumption, shipments in June may just about match consumption.

No one is guessing much further ahead than that. July is traditionally the slow summer month in copper and copper fabrication. "But, we have done some pretty heavy selling in some past Julys," cautions a seller.

The easing of copper markets is hurting the brass mills. They haven't lost any of the strength they picked up in the last few weeks. But the improvement is leveling. And if copper buying doesn't show up strong when producers open the books for June, there could be some regression in a few weeks.

First quarter reports from copper companies are generally optimistic. In reporting $1.65 per share earned through March this year, Kennecott Copper Corp. President Charles R. Cox said, "Domestic needs for consumption and inventory rebuilding should require full production of our U. S. mines well into the latter months of the year."

Magnesium

The Magnesium Assn. reports castings shipments for February down 2½ pct from the previous month. And they are down even more sharply from February 1959.

A total of 1043 tons was shipped in February, 1068 tons in January, and 1125 tons in February 1959.

The 352 tons of sand castings shipped in February was the lowest in a number of years, says the association. Total for permanent mold castings was 67 tons, anodes 322 tons, and diecastings 302 tons.

The Magnesium Assn. annual business meeting will be held at the Park Lane Hotel in London, England, starting May 23. Executives and technical men from both England and the U. S. will speak.

Titanium

A new man-portable recoilless gun capable of firing atomic shells will be made of titanium, the U. S. Army announces.

Titanium Metals Corporation of America estimates the project will require two million lb of titanium over the next five years. TMCA says total titanium shipments in 1959 were only about 6.5 million lb.

Alloys to be used on Davy Crockett—the gun's designation—include Ti-6A1-4V, Ti-7A1-4Mo, Ti-6A1-6V-2Sn, and Ti-155A. Only Ti-155A is a proprietary alloy of TMCA.

Tin prices for the week. May 4—99.25; May 5—99.25; May 6—99.125; May 9—99.00; May 10—99.00*.

* Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum pig	26.00	24.70	12/17/59
Aluminum ingot	28.10	26.80	12/17/59
Copper (E)	33.00	30-33	11/12/59
Copper (CS)	33.00	35.00	3/11/60
Copper (L)	33.00	31.50	11/6/59
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; Other primary prices, pg. 221.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.038	.048-.061	.077-.096	.136-.250
1100, 3003	47.8	47.3	46.2	45.1
5052	54.2	53.0	50.8	49.2
6061-0	51.0	49.8	47.9	46.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	44.7-46.2	53.2-60.8
18-32	45.2-46.8	57.7-79.9
33-38	48.8-51.4	83.3-94.5
39-44	58.7-62.4	99.9-121.0

Screw Machine Stock—2011-T-3

Size"	¼	⅜-½	⅝-1	1¼-1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	57.13	.....	54.86	58.32
Brass, Yellow	50.57	50.86	50.26	54.23
Brass, Low	53.53	53.82	53.22	57.09
Brass, R L	54.58	54.87	54.27	58.14
Brass, Naval	55.12	.....	48.68	58.78
Munts Metal	53.20	.....	48.26	.....
Comm. Bz.	56.17	56.46	55.86	59.48
Mang. Bz.	58.86	.....	52.21	.....
Phos. Bz. 5%	77.44	.....	78.13	.....

Free Cutting Brass Rod..... 36.06

TITANIUM

(Base prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; Bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismouth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb).... $1.75 to $1.82
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 29.95 to 36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9%, dollars per troy oz. $2.25
Iridium, dollars per troy oz.... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $213 to $215
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz.. $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 29.25
- No. 120 ..... 28.25
- No. 123 ..... 27.25

80-10-10 ingot
- No. 305 ..... 33.75
- No. 315 ..... 31.50

88-10-2 ingot
- No. 210 ..... 42.00
- No. 215 ..... 38.75
- No. 245 ..... 34.00

Yellow ingot
- No. 405 ..... 23.75

Manganese bronze
- No. 421 ..... 28.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 25.75-26.00
- 0.60 copper max. 25.50-25.75

Piston alloys (No. 132 type).. 28.00-29.00
No. 12 alum. (No. 2 grade)... 24.75-25.25
108 alloy 25.25-25.75
195 alloy 27.75-28.75
13 alloy (0.60 copper max.)... 25.75-26.00
AXS-679 (1 pct zinc) 25.00-26.00

Steel deoxidizing aluminum notch bar granulated or shot
Grade 1—95-97½% 25.25-26.25
Grade 2—92-95% 24.00-25.00
Grade 3—90-92% 23.00-24.00
Grade 4—85-90% 22.50-23.50

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26½
No. 2 copper wire	24¾
Light copper	22½
*Refinery brass	22¾
Copper bearing material	21

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26½
No. 2 copper wire	24½
Light copper	22¼
No. 1 composition	20½
No. 1 comp. turnings	20
Hvy. yellow brass solids	15
Brass pipe	14½
Radiators	16

Aluminum

Mixed old cast.	14	—15
Mixed new clips	16	—17
Mixed turnings, dry	14½	—15½

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	23	—23½
No. 2 copper wire	20	—20½
Light copper	18	—18½
Auto radiators (unsweated)	12½	—13
No. 1 composition	16½	—17
No. 1 composition turnings	15½	—16
Cocks and faucets	13	—13½
Clean heavy yellow brass	11¾	—12¼
Brass pipe	13½	—14
New soft brass clippings	14	—14½
No. 1 brass rod turnings	11½	—12

Aluminum

Alum. pistons and struts	7½	— 8
Aluminum crankcase	11¼	—11¾
1100 (2s) aluminum clippings	15	—15½
Old sheet and utensils	11¼	—11½
Borings and turnings	7	— 7½
Industrial castings	11½	—11¾
2020 (24S) clippings	12½	—13

Zinc

New zinc clippings	7	— 7¼
Old zinc	4½	— 5
Zinc routings	3½	— 3½
Old die cast scrap	2¾	— 3

Nickel and Monel

Pure nickel clippings	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	28-29
Clean Monel turnings	20-23
Old sheet Monel	24-26
Nickel silver clippings, mixed	18
Nickel silver turnings, mixed	15

Lead

Soft scrap lead	8	— 8¼
Battery plates (dry)	3	— 3½
Batteries, acid free	2	— 2¼

Miscellaneous

Block tin	75	—76
No. 1 pewter	55	—56
Auto babbitt	39	—40
Mixed common babbitt	9¾	—10¼
Solder joints	13¼	—13¾
Siphon tops		41
Small foundry type	9¾	—10¼
Monotype	9¾	—10¼
Lino. and stereotype	8¾	— 9
Electrotype	7½	— 7¾
Hand picked type shells	5¼	— 5¾
Lino. and stereo. dross	2½	— 2¾
Electro dross	2¼	— 2¾

(Effective May 9, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

(Effective May 9, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* 1.25-lb. base box	Electro** 0.25-lb. base box	Holloware Enameling 29 ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. tinmo deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1**, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets.

(Effective May 9, 1960)

*7.425 at Sharon-Niles is 7.225

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*					5.30 *N4*				8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, B5*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*				9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.675 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective May 9, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Chicago, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Steel Corp., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities — City Delivery‡ Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (18 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta	9.37	10.61	11.83	10.85	97.3	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore**....$.10	8.63	10.10	10.16	11.04	9.25	10.02	9.43	11.90	17.48	16.48	21.58	20.83
Birmingham**.....	8.46	10.20	10.69	9.45	8.41	8.47	7.66	13.14	16.76	.....	.....	.....
Boston**..... .10	9.77	10.68	11.87	12.26	9.72	10.26	7.59	13.45	17.69	16.69	21.79	21.04
Buffalo**..... .15	8.95	10.10	11.30	10.80	9.15	9.80	9.15	11.60	17.45	16.45	21.55	20.80
Chicago**..... .15	8.89	10.35	11.10	10.55	8.82	9.48	8.99	10.80	17.10	16.10	19.70	20.45
Cincinnati**..... .15	9.06	10.41	11.10	10.87	9.20	10.04	9.31	11.68	17.42	16.42	21.52	20.77
Cleveland**..... .15	8.88[1]	10.03	11.29	10.66	9.07	9.90	9.11	11.40	17.21	16.21	21.31	20.56
Denver..... .20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit**..... .15	9.15	10.61	11.45	10.92	9.19	10.04	9.30	11.16	17.38	16.38	21.48	20.73
Houston**.....	9.22	10.03	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**.... .15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**.....	9.95[1]	11.55	12.20	11.55	10.00	10.00	9.75	14.20	18.30	17.35	22.90	22.20
Memphis..... .15	8.55	9.80	.....	8.60	8.93	9.01	8.97	12.11	.....	.....	.....	.....
Milwaukee**.... .15	9.03	10.49	11.24	10.69	8.96	9.70	9.13	11.04	17.24	16.24	21.24	20.49
New York..... .10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	16.16	16.50	20.10	20.85
Norfolk..... .20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia..... .10	9.20	10.10	10.99	11.20	9.65	9.95	9.60	12.05	16.58	16.48	20.08	20.03
Pittsburgh**..... .15	8.88	10.03	11.18	10.64	8.83	9.51	9.00	11.40	17.10	16.10	19.70	20.45
Portland.....	10.00	11.75	13.30	11.95	11.50	11.10	9.85	15.30	18.50	17.45	20.75	20.25
San Francisco** .10	11.00	11.95[2]	11.65	12.25	11.00	10.95	10.75	15.20	18.30	17.35	22.90	22.20
Seattle**.....	10.07	11.44	12.05	11.84	10.17	10.59	9.96	16.20	18.60	17.80	22.70	22.20
Spokane**..... .15	10.07	11.44	12.05	11.84	10.17	10.59	9.96	16.35	17.75	17.95	21.58	22.35
St. Louis**..... .15	8.69	10.73	11.48	10.65	8.93	9.60	9.10	11.43	17.48	16.48	21.58	20.83
St. Paul**..... .15	9.19	9.74	10.89	10.81	9.10	9.78	9.27	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—½" x 1"; Plate—½" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅞" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 1.3¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective May 9, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46
Machine Screws—bulk		
¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1959 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective May 9, 1960)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	42.00	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	49.50	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	43.75	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	47.00	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld	Merch. Wire Galv.
	Col	Col	Col	Col	Col	¢/lb.	¢/lb.
Alabama City *R3*	173	187	.....	212	193	9.00	9.55
Aliquippa *J3***	173	190	.....	.....	190	9.00	9.675
Atlanta *A8***	175	193	.....	214	199	9.10	9.85
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dsv. *M4***	175	193	.....	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	.....	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	.....	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	.....	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	.....	219	203	9.10	9.775
Johnstown *B3***	173	190	177	.....	196	9.00	9.675
Joliet, Ill. *A5*	173	187	.....	212	193	9.00	9.55
Kokomo *C9**	175	189	.....	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	.....	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
Sparrows Pt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $280 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount. Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Ironton, O., f.o.b.	30.50
Detroit f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearney, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St. Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

(Effective May 9, 1960)

HOW LONG SINCE YOU CHECKED ON PERFORATIONS?

No matter what material your product demands Mundt can supply the exact perforation you need. Steel, brass, copper, monel, bronze, aluminum, zinc, tinplate, lead, stainless steel, coated metals, bonded materials, plastics, and paper are punched as required for every functional and ornamental need.

You can count on Mundt's guarantee that sheets are perfectly flat, straight, parallel on the sides, and free from buckle or camber.

Our modern tool and machine shop is constantly making new dies to add to the tremendous variety of screens available. If you have a special problem we'll gladly supply design and metallurgical assistance.

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CHARLES MUNDT & SONS

53 FAIRMOUNT AVENUE, JERSEY CITY 4, N. J.

PERFORATING SPECIALISTS FOR ALL TYPES OF MATERIALS

stack-molding gives you lower-cost castings

This 2¼-pound gray iron casting is a generator part for an automotive electrical system.

COSTS were CUT by casting 60 at a time . . . 5 to a mold . . . 12 molds high.

If you have high-volume requirements for fairly flat parts . . . investigate STACK-MOLDING.

to fill your IMMEDIATE NEEDS for QUALITY PRECISION CASTINGS at LOWER COST

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RELIABILITY . . . Uniformly high quality, with dependable composition and structure.

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HIGH STRENGTH . . . Heat-treating facilities available to provide any desired properties.

OVERNIGHT DELIVERY WITHIN 500 MILES

GL GREAT LAKES FOUNDERS & MACHINE CORP. LUDINGTON, MICH.

Specialists in Stack-, CO_2, and Shell-Mold Casting

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	38.00
0.05% C....	39.00	1.00% C....	37.75
0.10% C....	38.50	1.50% C....	37.50
0.20% C....	38.25	2.00% C....	37.25

4.00-4.50% C, 60-70% Cr, 1-2% Si.. 37.25
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 28.25
0.025% C (Simplex) 36.75
5-7% C, 61-65% Cr, 5-8% Si 22.00
5% max C, 50-55% Cr, 2% max Si.. 25.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, packed.
Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	28.25	14.60
Ton lots	33.50	16.05
Less ton lots	35.10	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.
Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
16-19% ..	$98.00	$96.00	$100.50
19-21% ..	100.00	98.00	102.50
21-23% ..	102.50	100.50	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen-removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% (Bulk) P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C.	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.
Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe..	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb..	2.40	3.30	4.55

(Effective May 9, 1960)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, delivered per pound
Ton lots $3.45
Less ton lots..... 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $255.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.
Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy 35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 39¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots... $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb and over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2303G North 11th St. • St. Louis 6, Mo.

CUT SCRAPER TIME

END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

THE DYKEM CO., 2303-G NORTH 11TH ST., ST. LOUIS 6, MO.

FORGINGS

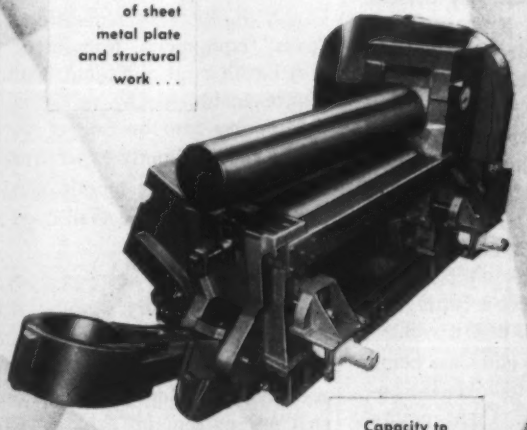
ALL SIZES, pressed . . rolled . . extruded . . forged to accurate specifications from carbon, alloy, stainless steels and special metals. Modern metallurgical, die, heat-treating and rough machining facilities.

Over 50 years of forging design and development

THE CANTON DROP FORGING & MFG. CO.
CANTON, OHIO

Our Line

Light and heavy machinery for all classes of sheet metal plate and structural work . . .



Capacity to 6 inch plate cold
THE LARGEST EVER BUILT

ORGANIZED 1879, INCORPORATED 1911

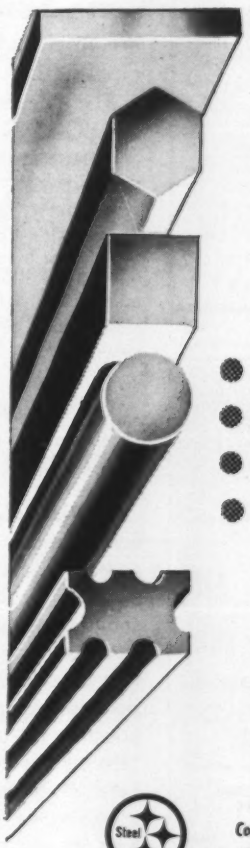
BERTSCH & COMPANY

CAMBRIDGE CITY INDIANA

QUALITY
in Your product begins assuredly with

MOLTRUP
Cold Drawn Steel

Give your products the basic quality of Moltrup Carbon, Alloy, or Leaded Steel — cold drawn to *close tolerances* that aid and simplify your operation. Save time and cut costs by ordering the exact shapes needed — Flats, Rounds, Squares, Hexagons, or Special Shapes to your specifications.



These Advantages Win Customer Satisfaction

- metallurgical quality control
- close-limit precision-production
- fast shipments direct from plant
- district warehouse distributors

Moltrup precision products include Key Stock, Screw Stock, Turned and Polished Shafting, Polished Steel Plates, Foundry Pattern, Core and Bottom Plates. Your order or inquiry will receive immediate attention.

Consult telephone directory, in cities listed, or ask us for name of distributor nearest you.

Phone: TI lden 6-3100

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Steel Products Co.
Beaver Falls, Pa.

Pittsburgh, Pa. Erie, Pa. Chicago, Ill. Detroit, Mich.
New York, N. Y. Syracuse, N. Y. Cincinnati, O.
Cleveland, O. Los Angeles, Calif.

S4

GUARANTEED—RE-NU-BILT

Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SLIP RING

Qu.	H.P.	Make	Type	Volts	Speed
1	1750	G.E.	M-579BS	4800	1800
1	1500	G.E.	MT	6600	1187
1	800	Whse.	CW	500	1776
1	800	G.E.	MT-428	2200	450
1	600	Whse.	CW	220/440	900
1	600	Whse.	CW-4-32D-15	440	1778
1	550	Whse.	CW	440	252
1	500	Whse.	CW	550	350
1	300	A.C.	ANY	440/2300	720
1	300	G.E.	MTP561	2200	1800
1	250	G.E.	IM-16	220/440	875
1	250	A.C.	ANY	550	600
1	250	Cr. Wh.	Size 29Q	2300	350
1	250	G.E.	MT-424Y	4000	257
1	200	G.E.	IE-13B	220	1800
2	200	Whse.	CW-890	2300	1775
2	200	G.E.	IM-17A	2200	435
1	200	G.E.	IM	2200	580
1	125	G.E.	MT-557	220/440	1200
3	100	A.C.		440	695

SQUIRREL CAGE

1	500	G.E.	FT-559AY	2200	3600
2	500	Whse.	CSP-583H	440	3600
1	500	Whse.	CS-1115	2200	863/445
4	500	Whse.	CS-1216	2200	500
2	450	Ell.	P-3910	2200	1200
1	400	Whse.	CS-7151 610H	6600/4000	3585
1	300	Whse.	CS-1002	2300/440	600
1	250	Whse.	CS-875S	2200	1775
1	200	Whse.	CSP-581S	440	3450
2	200	Whse.	CS-855S D.P.	220/440	1750
1	200	Whse.	CS-873C	2200	1160
1	150	G.E.	FT-558	2200	875
1	150	Whse.	CS	440	580
1	125	Whse.	CS-764C	220/440	1160
3	100	Whse.	CS-760C	2200/440	1100
1	100	Whse.	B.B.CS-607	220/440	1780

SYNCHRONOUS

1	6000	G.E.	ATI 8	200/6600	600
1	3500	G.E.	TS 1.0	4600/2300/4000	360
1	2000	G.E.	ATI	2300	900
2	1750	G.E.	ATI	2300	3600
1	1750	G.E.	TS	2300/4600	900
1	700	G.E.	TS 8P.F.	2300	1200
1	400	G.E.	TS-7563S	2200	1200
2	350	G.E.	ATI 1.0P.F.	2300	150
1	325	G.E.	ATI 1.0P.F.	140	1800
2	300	El Mach.	BRKT	2200	1200

BELYEA COMPANY, Inc.

47 Howell Street, Jersey City 6, N. J.
Tel. OL 3-3334

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

SLIP RING MOTORS

3 Phase—60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1**	5000	Ideal	Mill	6600/4160	440
1**	2500	G.E.	Mill	2300	296
1**	2500	G.E.	Mill	6600/4160	257
1**	1800	Whse.	Mill	2300	252
1**	1750	Whse.	Mill	2300	234
1**	1500	Al.Ch.	Mill	2300	508
1**	1300	Al.Ch.	Mill	2300	353
1**	1200	Al.Ch.	Mill	2300	505
1**	900	Al.Ch.	Mill	2300	160
1*	700	Whse.	CW-1224A	2300	585
1	500	Al.Ch.	ANY	2300	1175
1	500	Ideal	S-4-20	4800	708
1*	500	Al.Ch.	ANY	2300	505
1**	500	Al.Ch.	ANY	2300	293
1*	400	Al.Ch.	ANY	2300	505
1	400	Whse.	CW	2300	290
3	350	G.E.	I-M	2200	1180
1	300	G.E.	IE-15B	440	1200
1	300	Whse.	CW-1012	2200	704
1	250	Whse.	CW	4100/2400	716
1	250	Cr.Wh.	SR size Q	4600/2300	350
1	250	G.E.	MT-414	2200	300

**—Heavy duty, pedestal bearing, stator shifting bases.

*—Heavy duty, pedestal bearing, standard base.

OUTDOOR CIRCUIT BREAKERS

(Air—3-Pole)

Qu.	Amps.	KV	Make	Type	Int.	Cap.
3	1200	14.4	G.E.	ABA	1000	M.V.A.
2	1200	5	G.E.	AM	100	M.V.A.

(Oil—3-Pole)

1	400	73	Whse.	G-11	500	M.V.A.
1	600	69	G.E.	FK-339	500	M.V.A.
1	600	37	G.E.	FHKO-236	500	M.V.A.
1	400	37	G.E.	FHKO-136	250	M.V.A.
1	600	34.5	Al.Ch.	FZO-50-34X	250	M.F.A.
1	600	7.2	G.E.	FKO-227	50	M.V.A.

Transformer & Switchgear Package

3—833-KVA Allis-Chalmers Transformers, 1 ph., 60 cy., 13475/12375-11000/10175-V. Prim., 2300/4000-V. Secondary

1—G.E. Mag. outdoor O.C.B., type F.L.O., 600 amps., 14.4-KV, 250-MVA, int. cap.

T. B. MAC CABE COMPANY

4302 Clarissa St., Philadelphia 40, Penna.

Cable Address: "Macsteel" Philadelphia, Pa.

Phone: Devonport 4-8300

Chicago Sales Start Upward Climb

Used machine dealers in Chicago report sales are at last on the upswing.

Although it's slow, business is getting better than it was at the start of the year.

■ The pessimistic reports of mid-March are now being tempered with comment that inquiries, and in a few instances, sales, are on the gain.

Much of the current wave of hope can be traced to normal seasonal upswings in sheet metal fabricating equipment. This is always a strong item in the Chicago used tool market. This year the spring upsurge arrived late, but it did arrive. And it appears to be taking up some of the other machine tool lines as well.

A Big Bet — Machinery dealers now believe that, if they don't equal the excellent business levels of 1959, they'll come within at least shouting distance of that level. For example, one dealer who reports that his sales have shown absolutely no improvement since February, is boosting his stocks. As he puts it, "I've got a lot of money tied up here. If business doesn't turn up, it's going to hurt." He's betting, in high interest dollars, that it will.

Where April sales gains are being reported, they seem to cover the entire equipment line. Light equipment, usually sold into the job shop market, isn't booming by any means. But at least one out of two dealers reporting say they can point to measurable gains at this time.

The Demand—At the same time, heavy production equipment has netted some additional sales this month. Inquiries for lathes in the 50 in. swing category, for heavy presses, and even some milling equipment, have been popping up with increasing frequency since mid-April.

Heaviest interest from out-of-area in purchasing tools locally is reported from the West. But there has been a gain in East Coast interest over the past few weeks, and even Detroit buyers have checked over some of the material available at Chicago.

Upward Swing—General consensus is that April sales will not exceed March sales, when the final tally is taken, but they won't show any dropoffs either. May, on the basis of current reports, should show a mild pickup.

If there is optimism, it's confined largely to sellers of reconditioned or "as-is" equipment. Rebuilders report backlogs at minimum, with no improvement shaping up in either the inquiry rate or rate of actual sales. They currently expect further declines during the month of May, and express no more than hope for a June revival.

Buyers are very keen on price. If business were really slipping, there should be some indication of more substantial price concessions than are reported. General indication is that pricing remains firm, reflecting the optimism felt by a growing number of dealers. Those dealers who are building inventory in anticipation of a third quarter upswing say they aren't finding the kind of prices they'd expected in an economic downswing.

BRIGHT ANNEALING FURNACES . . . General Electric

Roller Hearth, 948 K.W. Capacity Equal to New Condition. 27" x 62" Opening, 112' long Convection Circulating Fans. Water Cooled—60' Cooling Chamber 5 ton per hour capacity. Air lock Purge Chambers, Flame Curtain, Max. Temperature 1700. (Chromax) 8000 CFH *Atmosphere* Generators.

TWO FOR SALE

Will trade, sell, exchange, lease or consider any reasonable proposition.

MACHINERY CONSULTANTS, INC.

6101 VERMONT ST. DETROIT 8, MICHIGAN TYler 8-9617

DIESEL LOCOMOTIVES & CRANES

25 Ton Industrial 60' Boom Crane
12 Gen. Elec. 23, 25, 44, 65 & 80 Ton Diesel Elec. Locos.
2—65 Ton Whitcomb, 1—115 Ton GM & 2—100 Ton Gen. Motors.

STANHOPE 60 E. 42nd St., N. Y. 17, N. Y.

RE-BUILDING *at its Best*

Miles rebuilding often adds features not present in the original machine. Here Miles mechanics are preparing the bed of a 90 inch x 34 ft. Niles lathe to receive hardened steel wearing plates. The result is greater accuracy over a longer period of time.

Borer, Model 62 Ex-Cell-O inclined cylinder
Broach, 6 ton 36" st. Colonial hy. dy. vertical dual hyd.
Drill, Horiz. Natco 2 way, late (2)
Drill, Mult. No. 4BL Natco 36 spdl.
Drill, Radial, 5' arm 13" col. Cincinnati Bickford super service, Model 3E
Bulldozer, 180 ton Model 27 Williams & White
Grinder, Cylindrical, 18"x36" Cincinnati Univ. hyd. Filmatic
Grinder, Internal, No. 47 Heald hyd. cross sliding headstock, late
Lathe, Automatic Gisholt, Simplimatic 15 HP MD. late
Lathe, Turret, 8½" Model 2H8 Libby, hy. dy. 20 HP MD
Mills, Boring, 4" Universal Tri-Way horiz. (2)
Lathe, Turret, 9¼" No. 4L Gisholt hy. dy.
Mill, No. 33 Model 1536 Sundstrand Rigidmil, Fluid-screw
Mill No. 5H K&T high speed dial type, plain
Mill, Thread, Model CT-36 Lees Bradner, late
Mills, Planer, 42" x 20" x 20' Ingersoll 20 HP MD
Mills, Continuous 72" swing Ingersoll 2 spdl. rotary
Press, 1000 ton No. 10C Ajax forging, air clutch, d.s.
Press, Horn 90 ton No. 75 Bliss Consolidated
Press, OBI, 75 ton No. 700B Perkins
Press, 60 ton No. 605 General Flexible
Saw, Cut-off, 3" No. 3 Modern
Saw, 10½" x 10½" Motch & Merryweather hyd. Cold saw late
Shaper, 28" G&E Industrial
Shaper, 66" Rockford hyd. openside hy. dy.
Shears, 38" throat New Doty No. 17F single end
Threader, Ex-Cell-O Model 35L thread grinder
Welder 200 KVA Federal air operated press type
Uncoiler, Cleveland cradle type MD hyd.
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BOX H-67
c/o The IRON AGE, Chestnut at 56th, Phila. 39

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BOX H-63
c/o The IRON AGE, Chestnut at 56th, Phila. 39

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Tool Rotating
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

AIR-CUSHIONED

vibration

Finishes parts up to 100 times faster!

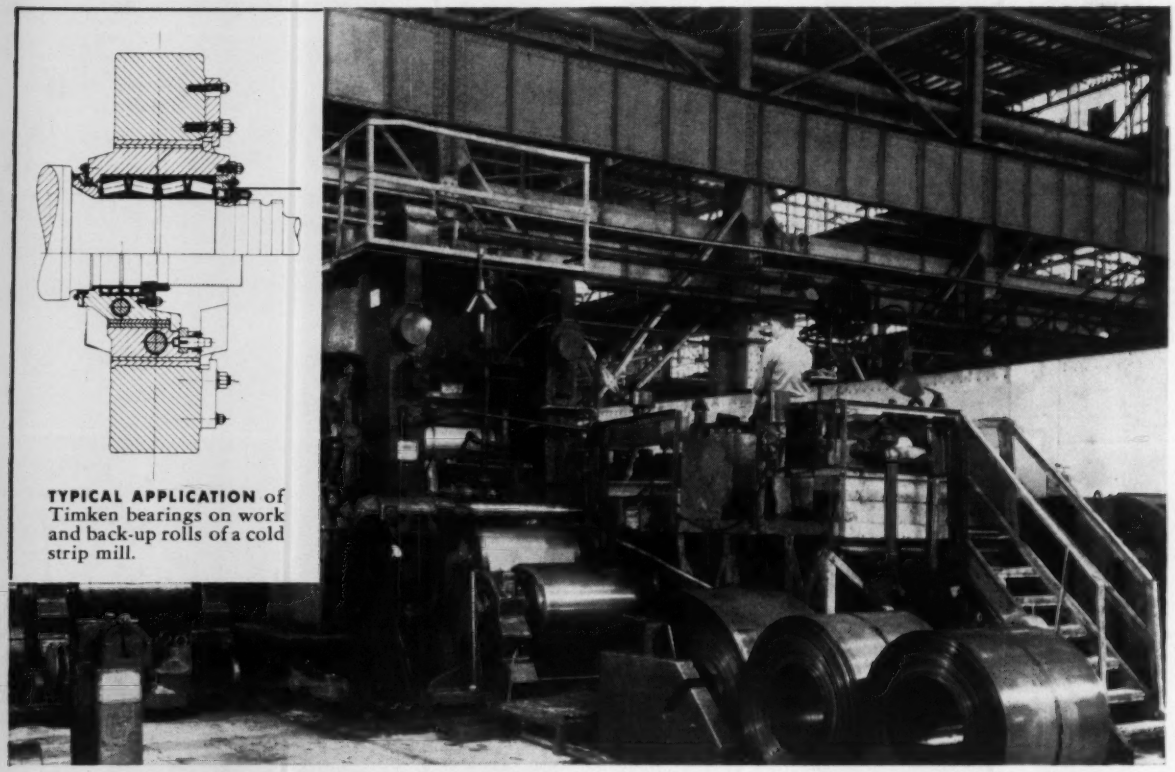
New Pangborn Air-Cushioned Vibratory Finishing Machine gives tremendous savings in finishing costs!

This is the 6 cu. ft. capacity Pangborn Air-Cushioned Vibratory Finishing Machine . . . perfect solution for cleaning, descaling, deburring, grinding, radiusing, fine-finishing, coloring or burnishing all metal and metal alloy parts, many suitable plastic and ceramic items.

- Works up to 100 times faster than conventional methods at lower cost.
- Most compact vibratory machine on the market.
- Air cushion suspension gives automatic leveling and amplitude control, supplants spring suspension systems subject to fatigue.
- Does work impossible to do by barrel finishing or other means.
- Standard basic machines are equipped with mechanically variable speeds.
- Floor vibration entirely eliminated, making possible (for the first time) second floor mounting.

Available in 1½, 3, 6, 12 and 18 cu. ft. net capacity sizes. Also auxiliary equipment, media and compounds for every need. Send parts with exact finish specifications, or finished specimen, for sample processing in our laboratory, to: Mr. William E. Brandt, PANGBORN CORPORATION, 1500 Pangborn Blvd., Hagerstown, Md.

Pangborn
OF HAGERSTOWN



TYPICAL APPLICATION of Timken bearings on work and back-up rolls of a cold strip mill.

Inland Steel boosts bearing load capacity 50% —just by switching to Timken® bearings

BY switching to Timken® bearings on the roll necks, Inland Steel obtained a 50% gain in load capacity with no increase in power demand on the 4-high cold reversing mill above. Longer bearing life resulted, too. What's more they gained these advantages without sacrifice of compact design. With previous bearing designs, momentary overloads caused premature failures. And low permissible screw down pressures limited rolling practice.

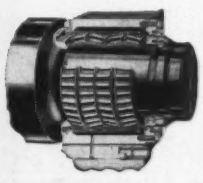
Timken roll neck bearings are used in over 1,000 mill installations around the world to assure minimum cost per ton of steel rolled. That's because: 1) *They roll the load*—virtually eliminate friction. Timken bearings have tapered design to take both radial and thrust loads. 2) *They are precision manufactured*—assuring close control of product gauge. 3) *They minimize maintenance;* Modern Timken roll neck bearings are designed to provide the best combination of bearing capacity, rigidity and roll neck strength for a given mill roll diameter. Bearings and roll necks stand up longer under load. Grease or oil mist lubrication provides further economies. And, 4) *They give longer bearing life.* Mill records show that service life of Timken back-up roll bearings has been obtained in excess of 12,000,000 tons of steel rolled. The full-line contact between rollers and races gives them extra load-carrying capacity.

When you buy or build a mill, make certain you buy the best in bearing performance and engineering service—specify Timken bearings.

When you buy Timken bearings you get...

1) Quality you can take for granted.
2) Service you can't get anywhere else.
3) The best-known name in bearings.
4) The pace setter in lower bearing costs. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.* Canadian Division: Canadian Timken, St. Thomas, Ontario.

Industry rolls on

TIMKEN®

tapered roller bearings